THE COLD CANVASS

By B. T. Umor

(Concluded from Page 1, Column 1)

conditions by sleeping on lumpy cots, walking down a hall to a general lavatory, and drinking warm tap water.

* * *

Cultured Family

Probably the best human interest story to come out of the A.S.R.E. summer meeting concerns the Field family, which was there in force.

Crosby Field, president of the A.S.R.E., president of the Flake-Ice Corp., is one of America's most prominent inventors, engineers, and promoters. He never seems to run out of fingers or pies to put them into.

But that isn't all. Like Eddie Cantor, he is a producer of talented daughters. Mr. Field has three. Margaret (she prefers to be called Peggy) is a senior at William & Mary college, and shows considerable promise as an anthropologist. Dorothy will probably enroll at Penn State in the fall, and is interested in the stage.

And Mary Ellen—ah! Now there's a girl. Blonde, blue-eyed, with perfectly chiseled features, and very fetching ways, Mary Ellen is slated to be a real heart-breaker in a dozen years or so. Already she has a way of sneaking her older sisters' beaus from under their very noses, getting them into a corner, and giving them the conversational works.

Mary Ellen wants to be an engineer, and take over her father's business enterprises some day. A few weeks ago she went downtown to a supply store, and ordered a slide rule.

"But little girl," smiled the proprietor indulgently, "a slide rule isn't a plaything. It's for advanced mathematical calculations."

"Oh, sure," replied Mary Ellen, pertly. "My father has taught me all about logarithms."

The proprietor hasn't recovered yet.

Warren Purchases Larkin Coil Co.

(Concluded from Page 1, Column 3)

a separate concern under the name Larkin Coils, Inc., Virgil P. Warren, president of Warren Co., announced last week.

Mr. Warren is president of the newly organized company; O. M. Sims of Georgia Railway & Power Co., formerly with the Warren Co., is vice president, and will manage the Atlanta plant; L. C. Warren is treasurer; and J. D. Harris, secretary-treasurer of Warren, is secretary.

In addition to obtaining the assets and real estate of Larkin Refrigerating Co., the new company also has acquired a one-third interest in the Lawa patents on coils, under which the coils produced by the former company were manufactured. The Guardian estate, Cleveland, is licenser of the Lawa patents.

In addition to the principal plant, here, the new company plans also to operate the Larkin plants in New York and Chicago, Mr. Warren said. Larkin Coils, Inc., is organized under the Georgia laws.

'Roominess' Is Feature Of New Crosley Model

(Concluded from Page 1, Column 5)

the new unit does not have some of the features of the higher-priced household refrigerators.

Liner of the food compartment is made of galvanized Armco ingot iron, instead of the usual porcelain interior, and there is no door on the ice compartment. Exterior finish is of Dulux.

Total shelf area is 11.98 sq. ft., with the five "Shelvador" racks inside the door. There are two ice cube trays with a total capacity of 42 cubes, and two deep dessert or ice trays making the total ice freezing capacity 9.5 lbs.

Rock wool insulation is used, and the hardware is chrome plated. Refrigerating unit is the latest Crosley open-type belt and pulley model, using sulphur dioxide refrigerant.

Cabinet dimensions are: height, 50 9/16 inches; width, 28½ inches; depth, 24¾ inches.

CLASSIFIED ADVERTISING

RATES: Fifty words or less in 6-point light-face type only, one insertion, $2.00, additional words four cents each. Three consecutive insertions $5.00, additional words ten cents each.

PAYMENT in advance is required for advertising in this column.

REPLIES to advertisements with Box No. should be addressed to Air Conditioning & Refrigeration News, 5229 Cass Ave., Detroit, Mich.

POSITIONS AVAILABLE

SALESMAN ACQUAINTED with distributors and utilities throughout country will find great opportunity for profit in sale of electric ranges and refrigerators and allied lines at sharply competitive and very attractive prices to these classes of trade. Bonus for volume should mean high earnings. Reply Box 1055, Air Conditioning & Refrigeration News.

POSITIONS WANTED

R.A.C.I. GRADUATE in refrigeration and air conditioning. One year's experience in domestic and commercial refrigeration service; ten years' experience as a machinist; one year shop foreman, machine tool division. LaSalle training in production control methods. Desire work in air conditioning or commercial refrigeration. College graduate; age 40. Box 1053, Air Conditioning & Refrigeration News.

ENGINEER WITH sales experience available July 25. Electrical engineering graduate. Age 26. Free to travel. With major manufacturer and factory branch 2½ years. Experimental, testing, research, residential and commercial air conditioning and refrigeration applications, cost estimating, proposals, heating surveys, and sales engineering. Teaching and executive ability. Personnel record if requested. Box 1057, Air conditioning & Refrigeration News.

SALES ENGINEER, air conditioning and commercial refrigeration. Wide experience contacting dealers and conducting sales engineering schools. Background includes consulting engineering, heating and sheet metal contracting. Intimate knowledge of every phase of the business. Have travelled extensively and now free to travel. Capable of taking full charge and producing results. Address Box 1058, Air Conditioning & Refrigeration News.

SALES ENGINEER (age 30) at present factory representative for nationally known manufacturer. Working and holding lectures with jobbers and manufacturers in the East, South and Middlewest. Has spent nine years in the industry, having had service, factory, field and sales engineering experience. Desires permanent connection. Box 1059, Air Conditioning & Refrigeration News.

BUSINESS FOR SALE

UNUSUAL OPPORTUNITY for capable serviceman. I have a service and installation business for sale at a fraction of its actual value. 100% return on your investment in one year! Estimated on 1936, 1937 and 1938 business. Manufacturer's service and installation contract, averaging $90.00 per month. Two creamery accounts averaging $50.00 per month. Large clientel acquired thru 13 years' service experience. City of 35,000 in southern California with large provincial territory. Write for additional details, now! Box 1054, Air Conditioning & Refrigeration News.

EQUIPMENT WANTED

INTERESTED IN purchasing 500 to 1,000 ⅓ and ½ H.P. refrigeration motors—new or used repulsion induction or capacitor type. Also interested in purchasing single or twin cylinder late type household compressors. Any quantity. FEDERAL REFRIGERATOR CORP., 57 E. 25th St., New York City.

REPAIR SERVICE

DOMESTIC CONTROLS repaired: Ranco pencil $1.75, Ranco box $2.00, General Electric $2.00, Tag $2.00, Cutler-Hammer $2.00, Penn $2.00, Bishop Babcock $2.50, Majestic $2.50, Penn magnetic $2.50, G. E. Frigidaire $2.50. In business over 20 years. Our name is our guarantee. UNITED SPEEDOMETER REPAIR CO., INC., 436 West 57th Street, New York City.

CONTROL REPAIR service. Your controls repaired by expert mechanics, with special precision equipment. Supervised by graduate engineers. We stress perfection and dependability before price. One year guarantee on domestic controls. Any bellows operated device repaired. HALECTRIC LABORATORY, 1793 Lakeview Road, Cleveland, Ohio.

MAJESTIC UNIT Replacements—The only original direct factory Majestic replacements. Guaranteed 18 months in writing. All models $30.00. Immediate delivery from our stock of 2,000 units. Also G. E. and Westinghouse rebuilding guaranteed 18 months from $30.00 up. Largest rebuilders of Hermetics in the world. G & G GENUINE MAJESTIC REFRIGERATOR AND RADIO PARTS SERVICE, 5801 Dickens, Chicago.

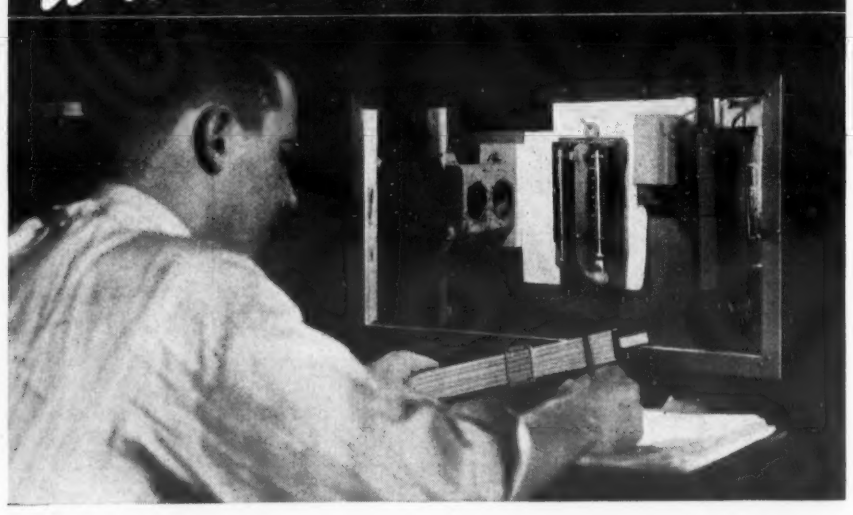
GENERAL ELECTRIC and Westinghouse hermetic units rebuilt. Guaranteed unconditionally for one year and returned to you refinished like new. Units are entirely disassembled in our large modern shop, tested through every step of production during rebuilding with the most complete test equipment for accurate work, then subjected to exhaustive running tests under actual operating conditions. Each unit measures to exacting standards after rebuilding. Prices $30.00 on General Electric DR-1, DR-2, and Westinghouse; $35.00 on General Electric DR-3. Quotations furnished on other models. Quick service—guaranteed work. REFRIGERATION MAINTENANCE CORP., 365 East Illinois St., Chicago, Ill.

100% SATISFACTION GUARANTEED—Hermetic rebuilding service. G.E.—Westinghouse—Majestic—U. S. Hermetic—etc. Our success in rebuilding sealed units is founded on these facts—10 years in the refrigeration industry—5 years' concentrated effort on hermetically sealed units. Customers in 37 states had hermetically sealed units rebuilt or exchanged by us in the past year. Complete factory equipment for precision rebuilding. One year guarantee on all rebuilt units. Exchange service available on most makes and models. Write for prices and descriptive literature. REX REFRIGERATION SERVICE, INC., 2226 S. State St., Chicago, Ill.

PATENTS

HAVE YOUR patent work done by a specialist. I have had more than 25 years' experience in refrigeration engineering. Prompt searches and reports. Reasonable fees. H. R. VAN DEVENTER (ASRE), Patent Attorney, 342 Madison Avenue, New York City.

WE BUILT A SWEAT BOX to torture Humidistats!



FROM ARID SAHARA TO A STEAMING TURKISH BATH . . . . . IN AN HOUR

In this sealed chamber, Penn engineers manufacture weather . . . relative humidities from near zero to saturation at all temperatures, from the cold of a quick-freeze chamber to the sizzling heat of a prairie summer day. Here, controlled drift of air is so small that it can be measured only with a super-sensitive "hot wire" anemometer.

Into this chamber go newly designed humidistats. "Torture them," were orders from the research chief. "Then see if they can 'come back' and *regulate* humidity at recognized comfort levels—30 . . . 35 . . . 40 percent. And, to the junk heap with designs and constructions that can't 'take it'!"

Every Penn control goes through this sort of intensive laboratory testing. Then comes field testing to make doubly sure of satisfying performance. Penn controls add prestige and reliability to your product . . . eliminate excessive service and installation expense.

PENN ELECTRIC SWITCH CO., GOSHEN, INDIANA. In Canada, Powerlite Devices, Ltd., Penn Electric Switch Division, Toronto, Ontario. Branches, Factory Representatives and Distributors in all principal cities.

PENN

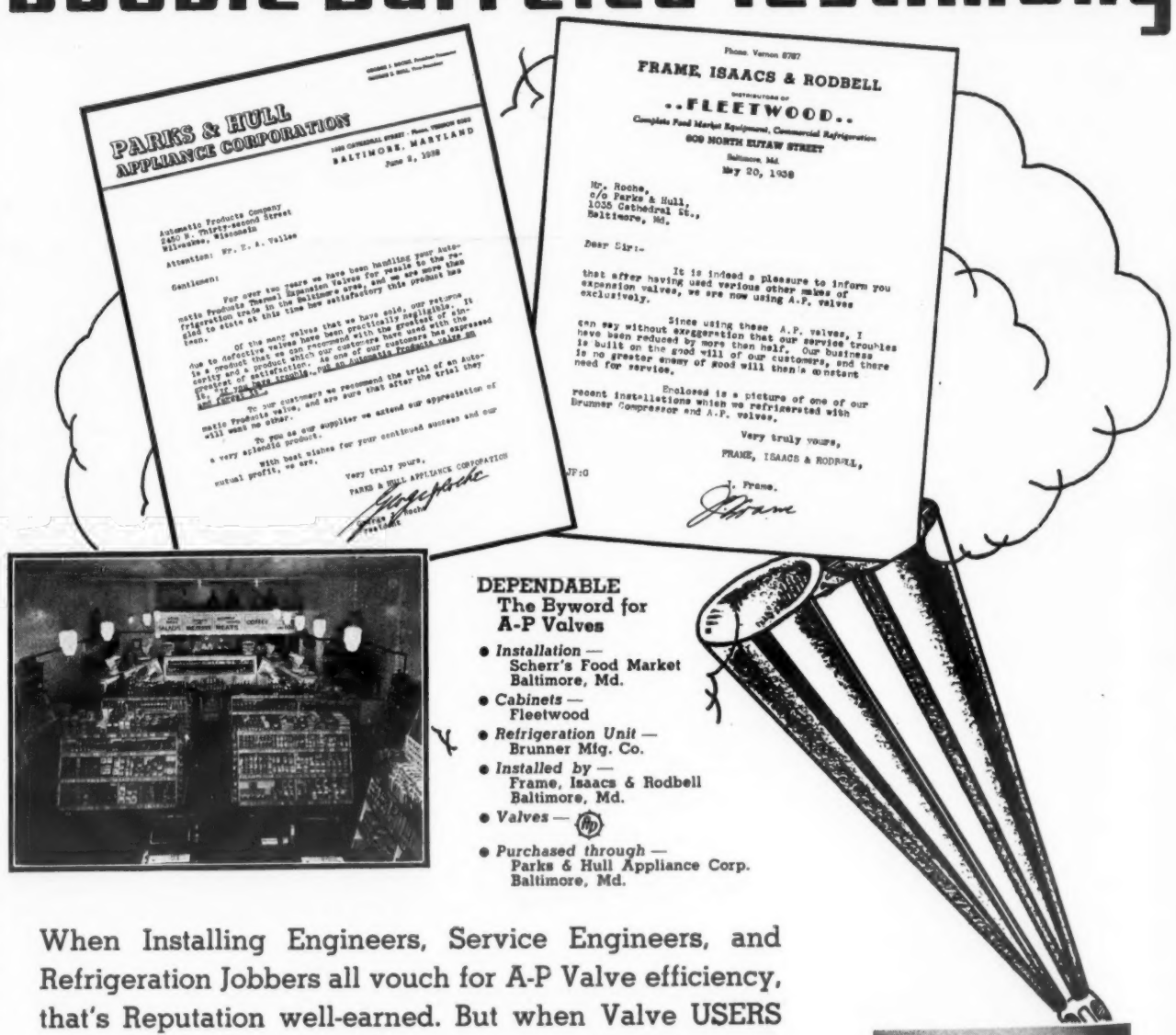
Penn Electric Switch Co., Dept. R-3, Goshen, Indiana. Mail us your catalog of Refrigeration Controls.

Name.....

Street.....

City..... State.....

Double-Barreled Testimony

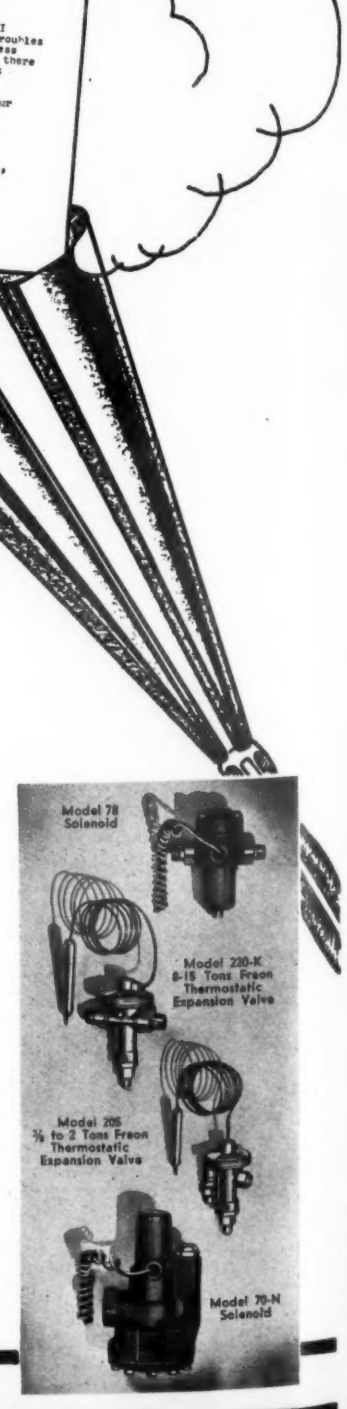

PARKS & HULL
APPLIANCE CORPORATION
BALTIMORE, MARYLAND
June 2, 1938
Automatic Products Company
2450 N. Thirty-second Street
Milwaukee, Wisconsin
Attention: Mr. E. A. Vallee
Gentlemen:
matic Products Thermal Expansion Valves for resale to the re-
frigeration trade in the Baltimore area, and we are more than
pleased to state at this time how satisfactory this product has
been.
Of the many valves that we have sold, our returns
due to defective valves have been practically negligible.
is a product that we can recommend with the greatest of sin-
cerity and a product which our customers have used with the
greatest of satisfaction. As one of our customers has expressed
it, "If you have trouble, put on Automatic Products valve and
and forget it."
To our customers we recommend the trial of an Auto-
matic Products valve, and are sure that after the trial they
will want no other.
To you as our supplier we extend our appreciation of
a very splendid product.
With best wishes for your continued success and our
mutual profit, we are,
Very truly yours,
PARKS & HULL APPLIANCE CORPORATION
FRAME, ISAACS & RODBELL
DISTRIBUTORS OF
..FLEETWOOD..
Complete Food Market Equipment, Commercial Refrigeration
809 NORTH EUTAW STREET
Baltimore, Md.
May 20, 1938
Mr. Roche,
c/o Parks & Hull,
1035 Cathedral St.,
Baltimore, Md.
Dear Sir:-
It is indeed a pleasure to inform you
that after having used various other makes of
expansion valves, we are now using A.P. valves
exclusively.
Since using these A.P. valves, I
can say without exaggeration that our service troubles
have been reduced by more than half. Our business
is built on the good will of our customers, and there
is no greater enemy of good will than a constant
need for service.
Enclosed is a picture of one of our
recent installations which we refrigerated with
Brunner Compressor and A.P. valves.
Very truly yours,
FRAME, ISAACS & RODBELL,
JF:G
J. Frame.

DEPENDABLE
The Byword for A-P Valves

- *Installation* — Scherr's Food Market Baltimore, Md.
- *Cabinets* — Fleetwood
- *Refrigeration Unit* — Brunner Mfg. Co.
- *Installed by* — Frame, Isaacs & Rodbell Baltimore, Md.
- *Valves* — (AP)
- *Purchased through* — Parks & Hull Appliance Corp. Baltimore, Md.

When Installing Engineers, Service Engineers, and Refrigeration Jobbers all vouch for A-P Valve efficiency, that's Reputation well-earned. But when Valve USERS add "If you have trouble, put on an A-P Valve and forget it" — here is more proof than any "doubting Thomas" would dare quibble about.

The enthusiastic testimony of the refrigeration industry's leaders surely is sufficient evidence that A-P Valves really have something. If you have not already proved this in your own experience, we'll welcome the opportunity to give you more information.


Model 78 Solenoid
Model 220-K 8-15 Tons Freon Thermostatic Expansion Valve
Model 205 ⅜ to 2 Tons Freon Thermostatic Expansion Valve
Model 70-N Solenoid

AUTOMATIC PRODUCTS COMPANY
2450 NORTH THIRTY — SECOND STREET
MILWAUKEE WISCONSIN

● REFRIGERATION PARTS JOBBERS, WHO RECOGNIZE QUALITY, STOCK (AP) CONTROLS

DEPENDABLE
THE BYWORD FOR A-P VALVES

PERIODICAL

First Copy

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JUL - 1938

Air Conditioning & Refrigeration News

The Newspaper of the Industry

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TWENTY CENTS PER COPY

THE COLD CANVASS

By B. T. Umor

Scientific Budget Control

Over at Mills Novelty Co. the boys are laughing over the following "scientific" family budget.

How To Live On $15.00 a Week

Whiskey and Beer	$ 8.80
Wife's Beer	1.65
Meat, Fish, Groc.....On Credit	
Rent .....Pay Next Week	
Mid-Week Whiskey	1.50
Coal .....Borrow Friend's	
Life Insurance (Wife's)	.50
Cigars, Cigarettes	.60
Movies	.60
Pinochle Club	.50
Hot Tip on Horses	.50
Laundry	.60
Poker Game	1.40
Total	$16.65

This means going into debt—
So cut out wife's beer.

* * *

Territory Tale

And then there's the tale about the zone manager who stormed into headquarters office, spoke to nobody, sat down at his desk, and angrily started writing.

"Hello there, chum," chirped the man who sat across from him. "How was your trip?"

No answer.

"Look here, I haven't seen you for three weeks. At least you can be civil."

"Don't bother me—I'm writin'," growled the zone manager.

"Well, what in tunket are you writing that can be so important as all that?"

"I'm writin' a letter to Hitler."

"To Hitler? For Pete's sake. What are you writing to him about?"

"He wants more territory. All right. He can have Akron, Toledo, and Youngstown!"

Okay, Herr Schlumbohm?

* * *

Colorful

When Jim Irwin left Frigidaire to join Monsanto chemicals, the refrigeration industry lost a colorful character.

His background reads like a pulp-magazine fiction extravaganza. Managing the Wisconsin State Journal in his teens . . . at 21 city editor of the Chicago Herald & Examiner . . . assistant to the fabulous Frederick G. Bonfils in Denver . . . assistant to the also fabulous Frank Carson in Detroit . . . member of the remarkable crew which the late C. T. Mutchner assembled in Dayton, which included Fred Shaw and Stan Tobin, ace publicists now with Geyer-Cornell-Newell, and Bill Saylor, Kelvinator promotion manager . . . author of the Dayton plan of employe-public relations . . . and still a very young man.

Just what Jim will do in the chemicals industry, we don't know; but it's a good wager that he'll inject some dash and color into it. He's a young man to watch, even if he has left "the industry."

* * *

Rotary International

The twenty-ninth annual convention of Rotary International at San Francisco, which adjourned a few days ago, was attended by 12,000 Rotarians and their ladies from 70 nations of the world.

Clarence F. (Sandy) Pratt, president of the California Refrigerator Co., San Francisco, was sergeant-at-Arms and had charge of seating, policing, etc., of all meetings. Many meetings had attendances of 4,000, 5,000, and 8,000 members.

"Sandy" found that there were

(Concluded on Page 5, Column 1)

40 Firms Exhibit At First Los Angeles Air-Cooling Show

LOS ANGELES—Some 40 manufacturers of air-conditioning, cooling, and heating equipment will be represented by exhibits in the first Los Angeles Air Conditioning, Cooling & Heating Show, to be held July 7 to 10, inclusive, in the headquarters of Thermo Air Conditioning Institute at 186 South Alvarado St. here.

Planned for the education of contractors, builders, architects, and home and building owners, the show will include equipment for air conditioning everything from small rooms to large auditoriums, sponsors say.

In addition to manufacturers' exhibits, there will be two complete displays showing the history of evaporative cooling and cooling by refrigeration. The motion picture projection room of Thermo Air Conditioning Institute also will be used to show films depicting the growth, progress, and unusual uses of air conditioning.

The auditorium also will be used for open forum discussions between engineers and contractors, builders, and home owners. Cooperating with

(Concluded on Page 2, Column 5)

Consolidated Edison Opens Sales Drive On 'Table-Top' Unit

NEW YORK CITY—Consolidated Edison Co. here has just opened a promotional campaign on the Brunswick "table-top" refrigerator, in which direct-mail advertising and personal follow-up will be used to promote sales of the combined beverage and food cooler to local merchants.

It is said to be the first time that the Consolidated Edison Co. has undertaken a campaign on such a scale to sell refrigeration to commercial establishments.

E. F. Jeffe, vice president of the Consolidated Edison Co. in charge of merchandising operations, has just released 32,000 mailings over his signature that will tell about the Brunswick-Balke-Collender product to every delicatessen store, grocery store, restaurant, and meat, poultry, and fish market in New York City.

This mailing will be followed up with another mailing to this list of 32,000 commercial prospects. These promotion letters contain enclosures describing the unit, and incorporate local testimonials from users.

Inquiries received as a result of this mailing will be followed up by the 462 business representatives of the Consolidated Edison Co., who have gone through a schooling period on the "table-top" refrigerator.

The utility company representatives will take orders for the refrigerator. These orders will be turned over to the local distributor, who will then clear them through approved Edison dealers.

Crosley Says 'Buy Now' Drive Brings Results

CINCINNATI—Evidence that the "Buy Now" campaign started a few months ago by Crosley Radio Corp. through its broadcasting stations WLW and WSAI is stimulating sales in several sections of the country is reported by Powel Crosley, Jr., president of the company.

The campaign, purpose of which was to encourage those who could afford to buy to do so in order to help those who could not, has been followed through successfully by organizations in many parts of the nation, Mr. Crosley says.

Augmenting the drive from Cros-

(Concluded on Page 2, Column 1)

Williams To Head Sales Department Of Airtemp, Inc.

B. S. WILLIAMS

* * *

DAYTON, Ohio—B. S. Williams, former vice president and general manager of Airtemp New York Co., Inc., has been appointed general sales manager of Airtemp, Inc., according to an announcement by A. C. Downey, president of the latter firm.

Mr. Williams will operate the sales department under the direction of I. C. Baker, vice president in charge of sales.

J. R. MacDonald, formerly sales manager of Airtemp New York Co., Inc., has succeeded Mr. Williams as manager of that organization.

Irwin Resigns As Head Of Frigidaire Publicity

DAYTON, Ohio, July 6—James W. Irwin has resigned as director of public relations for the Dayton divisions of General Motors Corp. (including Frigidaire) to join the executive staff of Monsanto Chemical Co., St. Louis, it was announced here today. Mr. Irwin has already left to take up his new duties in St. Louis.

Active in the appliance and automotive industries for the past 6½ years, Mr. Irwin had functioned here as spokesman for Frigidaire, Delco, and other operating divisions of General Motors.

Mr. Irwin left the University of Wisconsin at the age of 19 to go into newspaper work, and when he was 21 became city editor of the Chicago Herald and Examiner, gaining fame as the youngest city editor in the country. He later worked on newspapers in Denver and Detroit, before joining Frigidaire's publicity department, where he first handled air-conditioning publicity.

Later as director of public relations for Frigidaire he broadened the scope of his department until eventually he coordinated all the public and employe relations of the Dayton G-M divisions into a single operation under his direction.

'Sell Man With a Job' Theme of Sales Drive

BIRMINGHAM, Ala.—Local version of the National Salesmen's Crusade being sponsored by Nash-Kelvinator Corp. was set in motion here recently when 100 business executives and salesmen met at the Chamber of Commerce.

Theme of the meeting was: "Sell the man with a job." George Johnson, of Nash-Kelvinator, and Dr. E. Q. Hawk, professor of economics, Birmingham-Southern College, were the speakers.

Various business houses have set up placards promoting the campaign.

Salesmen's Union Opens Drive on Price Cutters In Milwaukee; First Chicago Contracts Signed

Agreement Said To Affect 150 Appliance Dealerships; Code Gets Approval

CHICAGO—The Illinois Radio & Electrical Dealers' Association has signed an agreement with the Retail Appliance Salesmen's Union of the Retail Clerks' International Protective Association, an A.F. of L. affiliate, regulating general trade practices as well as hiring and firing of salesmen, working hours, and compensation.

The agreement, first of its kind in Chicago, expires next Feb. 15. Unless cancelled at the end of the present period, the pact renews itself from year to year thereafter.

At present, the agreement binds more than 150 specialty appliance and radio dealerships, according to claims made by John Tunnis, president of the dealers' association. Stores now in the association currently employ more than 500 retail salesmen. A membership drive now under way is expected to boost association and union membership considerably.

Most provisions of the agreement here are similar to those of the recently-adopted Milwaukee retail salesmen's code (see the April 6 and April 27 issues of the NEWS). The union's drive here is said to have resulted from its work in improving trade practices in that city.

Strict adherence to the code of trade practices adopted by the Illinois Radio & Electrical Dealers' Association is stipulated in the union agreement. Attitude of the union apparently is that infractions of the code by dealers jeopardize salesmen's earnings, since offending dealers may lose their franchises. The trade practices code went into effect July 1.

On its part, the union agrees to accept and enforce the trade practices code of the association, holding that violation of fair trade contracts not only hinders salesmen from earning a living, but also "tends to demoralize the industry and prolong

(Concluded on Page 20, Column 2)

Hannah To Represent Standard In East

TOLEDO—H. D. Laidley, vice president of the Standard Electric Mfg. Co., manufacturer of electric ranges, has announced the appointment of L. J. Hannah as eastern district manager for the company.

Mr. Hannah was formerly New York wholesale manager for the Brunswick-Balke-Collender Co. on its Brunswick "table-top" refrigerator. Prior to that time he was an account executive for The Blackman Co., Campbell-Ewald Co., and the Ferry-Hanly Co., advertising agencies.

In addition to the electric line, Mr. Hannah will also represent the Burkay Co. on its gas water heaters and ranges.

Office arrangements in New York City are now being made and will be announced shortly.

National Dealers' Group Plans For '39 Meet

FORT WAYNE, Ind.—First annual convention and electrical appliance show of the National Association of Radio & Appliance Retailers, organized last March, will be held here the third week in March, 1939, Ralph Wegner, national treasurer and president of the local association, has announced.

Price Policies, Credit Standing of Dealers Being Surveyed

MILWAUKEE — Representatives of Milwaukee's Retail Electrical Appliance Salesmen's Union will seek the elimination of unsound retail outlets as part of their plan to stabilize the household appliance business in this area, it was disclosed last week following a conference of union leaders with household appliance distributors.

Announcement of this plan was followed later in the week by letters from union headquarters to distributors, listing as unfair three dealerships on which the union ban has fallen.

At the meeting, called at the request of union representatives, it was disclosed that the union is making a thorough survey of the Milwaukee area retail situation. This includes not only the shopping of dealerships in search of violation of the established trade-in allowances schedule, but also covers a check of credit standings, a compilation of the number of salesmen employed by various dealers, and figures on the number of refrigerators purchased by various stores this year.

While the purpose of this survey obviously is to try to bring about the distribution of electrical appliances through retail outlets where salesmen are employed, union representatives indicated at the meeting that there would be no attempt on their part to ban retail outlets simply because no salesmen are employed.

Placing of a store on the union's "unfair list," it was said, will be governed by the store's conduct regarding the trade rules sponsored by the union, and by its credit standing. Union representatives said they recognize the fact that a strong one-man retail store of today might be the big store of next week, employing salesmen who are union members.

In the meeting with distributors, the union representatives asked for a clarification and the establishment of uniformity in the method of handling refrigeration and other major appliance sales outside of Milwaukee county. They asked distributors to formulate and publish a policy covering this subject, for distribution to retail outlets.

Several of the major distributing agencies already have in effect policies that are satisfactory, it was revealed in discussions. Aim of the union is that Milwaukee salesmen-members may make sales of and collect commissions on merchandise sold here for delivery outside the county.

Trade-in allowances for used electric ranges, a subject not covered in the original trade-in code set up earlier by the union and the distribu-

(Concluded on Page 5, Column 2)

York Cuts Salaries of All Employes 10%

YORK, Pa.—York Ice Machinery Corp. has reduced the salaries of all its employes by 10% effective July 1, William S. Shipley, president, has announced. The horizontal reduction has been effected as an emergency economy and will remain in effect until further notice, Mr. Shipley stated.

In announcing the salary cut, Mr. Shipley explained to the salaried employes that since the current recession, at first thought to be a temporary situation, has become more serious and the business index has

(Concluded on Page 5, Column 5)

Rainy Days At A.S.H.V.E. Conclave Opened Way For Much 'Conferring'

Successive days of damp weather at the recent convention of the American Society of Heating & Ventilating Engineers at Hot Springs, Va., made "veranda sitting" a major activity during the convention, and probably giving the attending members and guests a better chance to talk over "conditions" than they might have had if the weather had been more favorable.

(1) R. T. Carrithers (center), advertising manager of AIR CONDITIONING & REFRIGERATION NEWS, gets an earful about some trends in the air-conditioning business from Charles Haynes (left), vice president, the Hoffman Specialty Co., and Perry West (right), of the University of Kentucky.

(2) W. L. Fleisher, consulting engineer from New York City, an engineer who has been very active in advancement of technical standards by the society, and generally in the forefront of discussions of new ideas. (3) Mrs. George F. Miller, wife of the executive of the C. A. Dunham Co.

(4) Howard E. Sproull, American Blower Corp. representative, caught by the photographer while engaged in one of the "veranda" discussions.

(5) Rex Vernon (left), advertising manager, Johnson Service Co., gets some first-hand knowledge about what is going on out in the field from A. V. Hutchinson (standing), secretary of the society, and Lester T. Avery, Avery Engineering Co., Cleveland.

Crosley's 'Buy Now' Drive Gets Results, Say Officials

(Concluded from Page 1, Column 2)

ley's end was the introduction of its "regular" line of Shelvador refrigerators, priced from $99.50 upwards, and the more recent introduction of a special 6-cu. ft. model selling at around $100.

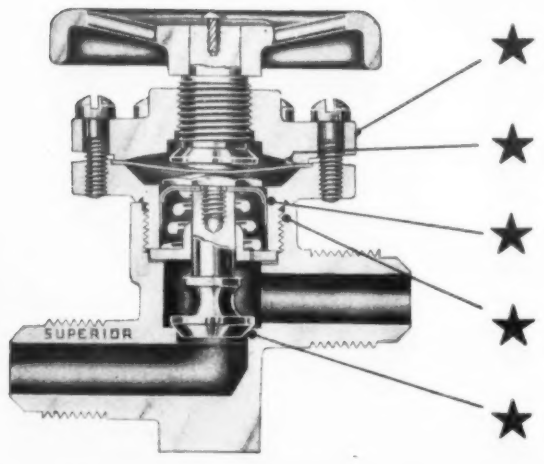
Increased sales volume on the "regular" line of electric refrigerators, as well as on automobile radio sets, has been reported by Crosley dealers from one end of the country to the other. Among distributors who report substantial sales gains since the new models were brought out are:

William Lyon of Appliance Distributing Co., Boston; C. R. Russell, president of Associated Wholesale Electric Co., Los Angeles; P. M. Lyon, president of Chanslor & Lyon Corp., San Francisco; and Louis Fox, sales manager of Lincoln Sales Corp., Baltimore.

Similar reports have come from distributors and dealers in other centers.

Write for your copy of Bulletin R2, describing this line of SUPERIOR Valves.

THESE SUPERIOR FEATURES ARE OUTSTANDING



★ Bolted Bonnet is readily removable for Diaphragm inspection or replacement—**with the refrigerant vapor or liquid pressure in the refrigeration system and in the valve.**

★ Multi-dissimilar-metal Diaphragm — larger than previously used in valves of this type—forms a positive metal-to-metal seal, and provides definite assurance against leaks.

★ Pressure cups—effective in ANY position—isolate pressure from Diaphragm Chamber; and prevent pressure surges from unnecessarily flexing the Diaphragm, assuring longer life.

★ Entire internal assembly is easily removed, to preclude any possibility of damage to the valve parts when soldering refrigerant lines to valve connections.

★ Advanced design of the valve seat assures easy "finger-tight" closing. Unrestricted flow area equal to, or in excess of line sizes.

SUPERIOR VALVE & FITTINGS COMPANY
500 THIRTY-SEVENTH STREET ★ PITTSBURGH, PA.

ASHVE Puts Emphasis On 'Human' Reactions

HOT SPRINGS, Va.—Further developments in the search for factors which control human comfort in air-conditioned places, with a view to improving standards for the maintenance of correct summer cooling conditions, featured the semi-annual meeting of the American Society of Heating & Ventilating Engineers here late in June.

Technical papers dealing with many phases of heating, ventilating, and summer air conditioning featured the convention. Particular attention was given to the comfort reactions of people in air-conditioned offices, measurement of the effects of air-conditioning shock, and a study of seasonal variation in effective temperature requirements.

J. F. MCINTIRE NEW PRESIDENT

J. F. McIntire, vice president of the U. S. Radiator Corp., Detroit, was nominated for national president of the A.H.S.V.E. for 1939, at the closing session of the meetings. Nominees will be voted on at the organization's annual meeting in Pittsburgh in January of next year.

Other nominations were as follows: For first vice president, F. E. Gieseke, professor of mechanical engineering, Texas Agricultural and Mechanical College, College Station, Tex.; for second vice president, W. L. Fleisher, consulting engineer, New York City; for treasurer, M. F. Blankin, president of the Haynes Selling Co., Philadelphia.

The following were nominated for members of the governing council of the A.S.H.V.E. for a three-year term: E. K. Campbell, president of the E. K. Campbell Co., Kansas City, Mo.; S. H. Downs, chief engineer of the Clarage Fan Co., Kalamazoo, Mich.; and A. J. Offner, consulting engineer, New York City.

Approximately 200 members and guests registered at the convention headquarters in the Homestead here for the three-day technical and business session.

WHITE COLLAR REACTIONS

Papers given the closing day of the meeting on the "Shock Experiences of 275 Workers After Entering and Leaving Cooled and Air-Conditioned Offices," and the "General Reactions of 274 Office Workers to Summer Cooling and Air Conditioning," proved of unusual interest to members attending the technical sessions.

Prepared by A. B. Newton, F. C. Houghten, R. W. Qualley, Carl Gutherlet, Edw. Witkowski, and M. C. W. Tomlinson, the studies indicated that the majority of office workers experienced very little shock or discomfort on leaving a conditioned space, and that the majority of office workers expressed a general satisfaction with air conditioning.

The papers pointed out that many of the popular conceptions of air conditioning, such as increase in colds, shock on leaving the cooled space, and tendency to rheumatism, are exceptions which prove the rule rather than a general experience of any group of workers.

40 Firms To Take Part In Los Angeles Show

(Concluded from Page 1, Column 2)

the show committee are the various engineering societies whose interests include air conditioning, besides Southern California Edison Co., Los Angeles Chamber of Commerce, and Los Angeles Bureau of Power & Light.

Companies which will have exhibits at the show include General Electric, Frigidaire, Carrier, York, Chrysler's Airtemp, Fairbanks-Morse, Payne Furnace, Pernot & Rich, Thermadore, and Westinghouse.

The exposition will be open from 10 a.m. to 10 p.m., and more than 10,000 sq. ft. of floor space will be used in the show, officials say. All available exhibit space has been taken.

Acting as secretary to the show committee is William W. Sanford of Thermo Air Conditioning Institute, who has working with him H. H. Douglas of Southern California Edison Co. as chairman.

Other members of the committee are: Earl S. Anderson, manager, construction industry department, Chamber of Commerce; Ben B. Breslow, Utility Fan & Mfg. Co.; W. E. Cranston, Jr., Thermador Electric Mfg. Co.; Ivan DeJongh, DeJongh-Howells Corp.; Harry F. Haldeman, Harry F. Haldeman, Inc.; W. L. Halladay, Geo. Belsey Co.; George Hartman, Hartman Engineering Co.; F. E. Hockensmith, Electrical Development League.

Edward H. Kendall, English & Lauer; O. W. Ott, consulting engineer; W. V. Pearse, Los Angeles Bureau of Power & Light; Frederick Pernot, Pernot & Rich, Inc.; Wm. Pruitt, Gay Engineering Corp.; Emmett Quinn, Pacific Fruit Express; Robert Stanley, Payne Furnace & Supply Co.; L. W. Tannehill, Southern California Gas Co.; A. B. Wicks, department of building and safety, City of Los Angeles.

Automatic Sealtight Seals provide positive seal at all times, regardless of refrigerant. Higher the pressure . . . tighter the seal. Seals on seal nut, not shaft . . . no shaft wear, less spring tension, less power consumption, insures proper lubrication and reduces wear. ¼ H.P. to 25 H.P. models. Write for new catalog.

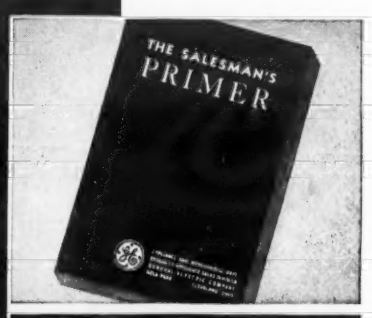
MERCHANT & EVANS CO.
Phila., Pa., U. S. A. Plant at Lancaster, Pa.

"THANKS TO GENERAL ELECTRIC'S SALES TRAINING I KNOW WHAT I'M TALKING ABOUT ...AND IT PAYS!"

NOT only "how to sell," but "how to sell *more*" is the mission of General Electric's sales training for electrical appliance retailers and their salespeople.

Designed and produced by *successful salesmen*, G-E sales training methods are the most comprehensive and most effective in the entire industry.

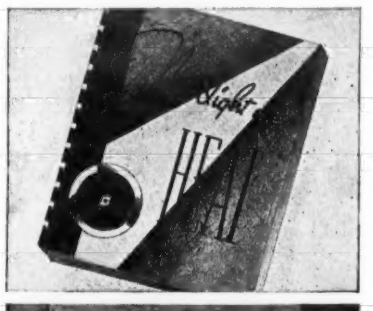
You can sell *more* electric kitchen appliances, *more* laundry appliances or *more* commercial refrigeration products, through G-E sales training. Ask any G-E Dealer and Salesman who has graduated from the G-E "sales school!" You'll find principal subjects in the "course" outlined below.



SALESMAN'S PRIMER. The complete sales story of G-E Triple-Thrift Refrigerators in one handy, easy-to-read book. Written in the combined words of hundreds of successful G-E salespeople.

★

"NEW LIGHT ON HEAT." The advantages of electric cookery presented in a *new way.* A profusely illustrated book that will make any electric range salesman a better salesman.



★

BORDEN AND BUSSE TALKING PICTURES. Intensely interesting portrayal of right and wrong ways of sales approach, presentation, and close. Available free through G-E Distributor when used in connection with sales training on G-E home appliances.

★

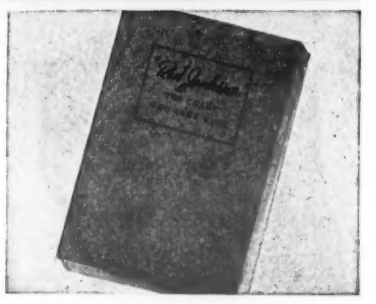
SOUND SLIDE FILMS. A complete G-E sales training course in words and pictures. The quick, easy, effective way to understand the sales features, advantages and applications of General Electric appliances.

★

SALESMEN'S BULLETINS. Periodical, illustrated mailings containing specific information, up-to-the-minute news and timely sales pointers on General Electric appliances. A helpful and popular service to General Electric salespeople.

★

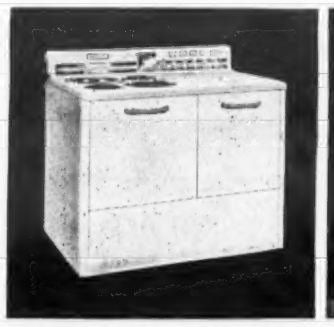
"RED JENKINS"—the thrilling sales story of the G-E Electric Sink (with Dishwasher and Disposall), presented in intriguing, narrative form.



General Electric Company, Specialty Appliance Division, Nela Park, Cleveland, Ohio.

"GO TO TOWN" on the MAINLINE
G-E Refrigerators, Ranges, Electric Sink with Dishwasher and Disposall, Water Heaters, Washers, Ironers, "Packaged" Commercial Refrigeration Products.
1938

The COMPLETE line of electrical home appliances...every one proved by performance, tested by time!



GENERAL ELECTRIC RANGE with Tel-a-Cook Lights, Select-a-Speed Calrod Cooking Unit, Tripl-Oven and other advanced features.

GENERAL ELECTRIC TRIPLE THRIFT REFRIGERATOR. The refrigerator that started a new "Save Wave" in America.

GENERAL ELECTRIC SINK with Dishwasher and Disposall, washes the dishes, disposes of food wastes ... *electrically.*

GENERAL ELECTRIC

Profitable Sales Ideas

Directness of Appeal In Window Displays, Advertising & Personal Selling Brings Results For Texas Furniture Store

SAN ANTONIO, Tex.—"Don't beat around the bush in trying to convince a prospect of the superiority of mechanical refrigeration over the 'ice box way'—offer plain, unvarnished facts and figures, instead," advises H. S. Affleck, manager of the refrigeration department of G. A. Stowers Furniture Co. here.

Directness is invaluable, Mr. Affleck believes, whether used in window display, advertising, or personal sales effort. A recent window display used by the Stowers company illustrates this principle well.

Background of this display (devoted exclusively to refrigeration) was a large "Temperature Chart" painted on wallboard. This was marked off into sections, with one side showing the "positive zone—45-50°" and the other side showing the "danger zone" of higher, irregular temperatures.

On the "positive" side of this display were several models of new mechanical refrigerators, while on the "danger" side were three old-style ice boxes. Small cards, appropriately placed, told of the advantages of modern mechanical refrigeration compared to the disadvantages of the old ice box.

Another portion of the display showed two bottles of mayonnaise, a large one and a small one, a large and small can of corn, a large and small can of pineapple, etc. By each of these items was the price, and an accompanying poster pointed to the savings which the housewife can effect by buying food in larger quantities and then preserving it safely in her mechanical refrigerator.

"Thirty-six per cent of your income goes for food—20% of all perishable food is wasted by spoilage," read another card. Still another stressed the bother and expense of using an old-style ice box.

"Every refrigerator dealer has at his disposal facts like these which will make a housewife think," Mr. Affleck declares, "and these facts should be utilized to the limit of their possibilities.

"Forget 'gadgets' and other non-essentials. Base your sales argument on fundamentals—they're unbeatable."

The Stowers company stimulates interest among its refrigerator salesmen by running frequent but brief sales contests of various types. Usually no contest lasts longer than two weeks, as Mr. Affleck has found that interest is kept at a higher pitch by a series of short contests than by a few of longer duration.

June Bride Featured In Range Advertising

MANCHESTER, N. H.—Using the sentimental theme of the June bride, Public Service Co. of New Hampshire has been emphasizing the advantages of Hotpoint electric ranges in a series of newspaper advertisements.

Centered around a photograph of a bride, the advertisements were headed, "We all know the bride should wear something old, something new, something borrowed, something blue, but what should she use for cooking?"

Energetic Salesmanship and Dealer Cooperation Puts Distributor Salesman In Toppers Club

PLAINFIELD, N. J.—By selling $5,276.60 worth of electric refrigerators during the first two months of this year, Alexander Sheara, manager of the local branch of Lakeview Distributing Co., General Electric appliance dealer, has earned himself a membership in the 1939 "Toppers Club," G-E's fraternity for salesmen who pass the $5,000 mark in a year.

Key to this sales record, Mr. Sheara asserts, has been nothing more than energetic salesmanship and dealer cooperation. For salesmen, Mr. Sheara establishes the following rules: hard work, perseverance, knowledge of product and people, confidence, and maintenance of a complete record of sales and prospects.

Dealer cooperation, Mr. Sheara states, should furnish proper and ample sales promotion through newspaper advertising and other mediums, quality merchandise, assurance of quick delivery, and maintenance of attractive floor displays.

Hard work and plenty of it is needed in the electric refrigerator sales field, says Mr. Sheara.

"Hard work means long hours," he points out. "Every day but Sunday, and often more than 13 hours a day. Salesmen must be willing to do hard work and any kind of work, not only in the field but in the shop, even if it includes such dirty work as cleaning out the shop cellar. First thing for the salesman to realize is that he will not get any more out of the business than he puts in.

"Perseverance goes hand in hand with hard work. The salesman must learn never to take 'no' for an answer, and he must stick to the goal he sets for himself. If the successful salesman makes 10 calls and finds five of the prospects out, he will make five more calls.

"The salesman must know his product and know people. He must learn to study and keep on studying; there always is more to learn.

"The old idea of a routine sales talk for all people is a fallacy. Every person has individual traits and sales weaknesses. These must be recognized and each handled in a different manner. The man who learns to see these points the quickest and handle them properly will sell the most refrigerators."

It is Mr. Sheara's contention that, despite general business conditions, there are people with jobs who have money and are willing to spend it on something worth while.

Convincing such people that an electric refrigerator is "something worth while" should be the salesman's objective, Mr. Sheara believes.

Sales records are valuable as an index for future prospects, Mr. Sheara states, and a record of current prospects is an absolute necessity. No prospects should be abandoned until every possible sales effort and approach has been exhausted, and even then many prospects may be of future value.

Dealer cooperation was responsible for a large share of his sales record, Mr. Sheara declares, particularly that received from Philip H. Harrison & Co. of Newark, G-E distributor in northern New Jersey.

On several occasions, he explains, not enough models were in stock on his sales floor, and he took the prospects to the Harrison sales room where a large display is maintained and where, with the distributor's cooperation, sales were closed.

"Continuous advertising by the dealer, tied in with national factory advertising, is necessary to impress the name of the product and its local headquarters in the public mind," Mr. Sheara states. "With this point reached, it then becomes the duty of the salesman to honestly show the public what is behind the name and actually sell the product."

Allentown Dealer Boosts Appliance Sales To New High By Getting Salesmen To Overcome Excuses For Not Buying

ALLENTOWN, Pa.—By getting its salesmen to realize that the old "I can't afford to buy" dodge is no more valid as an excuse today than it was when times were better, and by insisting that signed orders, and not promises, constitute a sale, Brumbaugh Electric Co. is showing electrical appliance business gains over any previous year, reports Owner J. P. Brumbaugh.

"We are today selling more electric refrigerators and other appliances than at any time in the past," Mr. Brumbaugh stated, "because we have made a particular study of the most effective methods that can be used to overcome the prospect's objection.

"Only recently we contacted a prospect who needed a refrigerator, but she had constantly evaded salesmen with the old excuse. When I asked whether she could afford to buy an extra quart of milk a day if she needed it, she admitted that she could.

"Then I said, 'If I were to come here and tell you that you couldn't afford to buy an extra quart of milk, you would feel insulted—and properly so. And yet you need this refrigerator more than you need an extra quart of milk, and it costs you no more each day than the milk would cost you.'

"By using this method to show that her objection was merely a barrier she had erected for herself to avoid buying, I was able to gain her interest and make the sale. The success of the problem depended on breaking down that objection."

Realizing that there are a good many prospects who do not have the money to buy appliances, Mr. Brumbaugh nevertheless contends that salesmen miss selling to 60% of their prospects because they do not determine the actual financial status and do not make enough of an effort to break down the "no money" excuse.

Salesmen also lose sales by naively accepting a "verbal" order without getting the purchaser's name on any form of sales contract, Mr. Brumbaugh pointed out.

"An appliance is not sold," he emphasized, "until delivery is made and the first payment is in the salesman's hands. Many salesmen are learning this to their sorrow, and we show our salesmen how a verbal order can easily turn out to be no order at all.

"As an illustration, I called on a prospect recently and was informed that he had ordered a refrigerator from another salesman the previous day.

"It developed, however, that the salesman had not asked for any payment, and had not even bothered to get a signed order. An hour later the prospect called up that salesman and told him to cancel the order. I left the house with a signed order, and a substantial payment on account."

Mr. Brumbaugh maintains that such negligence is as much the fault of the sales manager as of the salesman, because it indicates lack of proper training.

Having spent 16 years training salesmen throughout the country before he set up his own business, Mr. Brumbaugh feels that he is qualified to talk about proper training.

"In training appliance salesmen," he said, "I insist on a sales meeting every morning before they go out in the territory. Before a man starts out, I want to be sure that he is not uncertain about his work or some problem he had the day before.

"The old theory of giving a man a week's training and then turning him loose, putting him on his own from that point, is all wrong. The average new salesman requires constant repetition of instructions. In my instructions, I may repeat the same thing 50 times over a period of six months, but each time I bring out that point, I do it from a different angle."

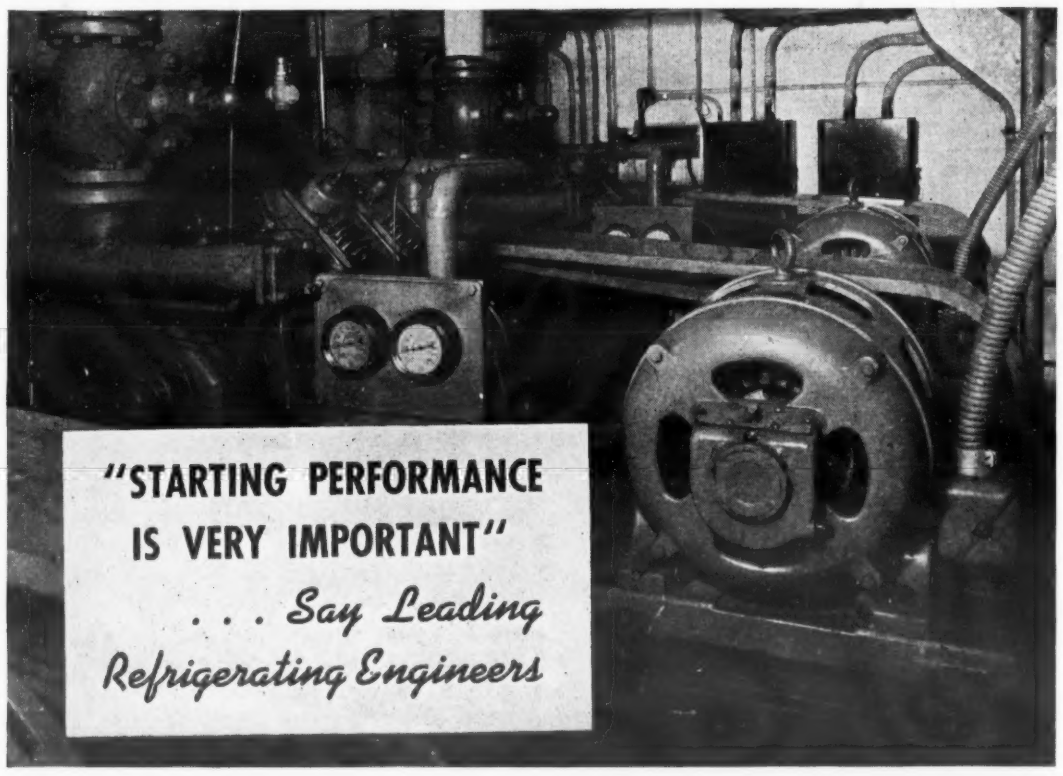
Thorough knowledge of the line he is selling, and willingness to work and follow instructions are Mr. Brumbaugh's two most important requirements in a salesman.

Cleveland Store Installs Three Model Kitchens

CLEVELAND—Sterling & Welch Co., home furnishings store, has announced its new kitchen planning service, providing for installation of an entirely new kitchen or modernization of an old one.

Three model kitchens have been built in the store itself, featuring General Electric appliances in actual operation. A trained home economist is in charge.

The store is emphasizing this new service in its advertising, and is stressing the fact that existing kitchens may be modernized at surprisingly low cost.



STARTING • ACCELERATING • RUNNING

Refrigerating Engineers say that Century Motors have all the starting and accelerating torque necessary to meet the tough requirements of Refrigeration Compressor drives—one of the hardest jobs in industry.

START QUIETLY • RUN QUIETLY • ARE REMARKABLY FREE FROM VIBRATION

Specify Century Motors for Refrigeration Compressors.

CENTURY ELECTRIC COMPANY
1806 Pine Street . . . St. Louis, Mo.
Offices and Stock Points in Principal Cities

Century MOTORS

MASTERCRAFT
ADJUSTABLE PAD AND CARRYING HARNESS
The most efficient and economical equipment made for handling refrigerators safely and without scratching or marring. Pad is separate from harness and both adjustable to all styles and sizes of cabinets. Efficient, sturdy, easily and quickly applied. Name of refrigerator attractively lettered on pad without charge.

Adjustable Pad, $9.50 each
Adjustable Harness $6.00 each f.o.b. Chicago.
Write for 1938 folder and prices on pads for refrigerators, washers, ironers, ranges, radios, etc.
Pat. Appl'd for
BEARSE MANUFACTURING CO.
3815-3825 Cortland Street, Chicago, Illinois

BUNDY TUBING
Copper-Brazed Steel. Copper Coated Inside and Out. Sizes: ⅛" to ⅝" O.D.
BUNDY TUBING CO., DETROIT

THE COLD CANVASS

By B. T. Umor

(Concluded from Page 1, Column 1)
refrigeration and air-conditioning men from many cities around the world. Here are names of some of those he discovered:

T. C. Thomsen, Copenhagen, Denmark, a refrigeration engineer; Pennescu Kertsch, Frigidaire dealer at Bucaresti, Roumania; Charles Johnson, Virginia Smelting Co., W. Norfolk, Va.; Frank Chapman, president, The M. W. Dunton Co., Providence, R. I.; J. Frank Gross, North Campton, Ohio, Westinghouse, Hotpoint, and Electrolux dealer; T. Housemann, Gibson and Mayflower electric and ice box dealer, Williamstown, N. J.; I. A. Rosok, Arizona Edison Power Co., Bisbee, Ariz.; Ed. Chism, ice cream manufacturer, Reno, Nev.

Raymond Enright, Frigidaire dealer (first in California), Ukiah, Calif.; George Martin, dealer, Gilroy, Calif.; Earl Wilson, Kelvinator dealer, Napa, Calif.; Richard Oberst, York dealer, Sacramento, Calif.; Himmie W. Jacobs, Leonard dealer, Santa Rosa, Calif.; Worth Brown, ice cream manufacturer, Capitola, Calif.

Stanley McKenzie, Creameries of America, Los Angeles, Calif.; Ernest Nielson, Kelvinator dealer, Petaluma, Calif.; George Linder, General Electric dealer, Tulare, Calif.; Fred H. Pelle, General Electric dealer, San Mateo, Calif.; W. H. Turpin, refrigerator dealer, Fresno, Calif.

San Francisco refrigeration and air-conditioning men included: Raymond Alvord, manager, General Electric Co., San Francisco; Harold Basford, northern California Kelvinator distributor; Dan Bosschart, soda fountain distributor; Ross Clark, American Radiator Co.; Richard Costello, Frigidaire dealer; Arthur Forderer, manufacturer of air-conditioning equipment; Charles Hardy, B. F. Sturtevant Co.; Frank Hook, thermostats distributor.

Albert Howell, Revere Copper & Brass, Inc.; Robert Jones, Golden State Ice Cream Co.; Gustave Lachman, refrigerator dealer; William Leland, heating and ventilating engineer; Wm. Levensaler, distributor of Sparton refrigerators; Chas. Melrose, ice manufacturer; Chas. Merrill, manufacturer of Holbrook refrigerators; George Perham, president, Borden's dairy delivery; Wm. Sherman, president, Merchants Ice & Cold Storage Co.; James Smith, Great Western Electro Chemical Co. (Polar brand sulphur dioxide); Thos. Walsh of Chanslor & Lyons, Crosley distributor; Edward Ward, Westinghouse air-conditioning engineer.

• • •

Charming Thespian

Mrs. W. R. Hainsworth, wife of Servel's research director, whose beauty of face and figure is matched only by the beauty of her diction, starred in a little dramatic skit before the recent A.S.R.E. midyear meeting at State College, Pa.

Well-known in New York Little Theater circles, Mrs. Hainsworth has done considerable radio broadcasting, and has worked in several pictures for Warner Bros.

If you should go to see the highly publicized "Birth of a Baby" film, watch for Mrs. Hainsworth. She's in it.

• • •

Wit & Humor

There are a number of first-class wags among the younger members of the A.S.R.E., and they wowed the convention. Chaps like Art Schellenberg of Alco Valve, Bill Higham of Universal Cooler, and Eddie McGovern of R. & H. Chemicals should sell their wisecracks to the badgered and beleaguered radio comedians.

Wednesday night a small group was listening to the abbreviated Louis-Schmeling fight. When Schmeling's seconds threw in the towel, McGovern opined:

"Hitler will have to take Czechoslovakia now to make up for this blow to Aryan prestige."

• • •

Hollywood Influence

A folder distributed by Sandy Pratt's California Refrigerator Co. describes their new catalog as **stupendous, colossal, gigantic.**

Milwaukee Union To Set Own Scale on Range Trade-Ins

(Concluded from Page 1, Column 5)
tor organization, also were brought up at the conference.

The original $10 to $20 allowance schedule established for used gas ranges cannot reasonably be applied to deals involving used electric ranges, union representatives pointed out. Finally it was decided to let the union itself fix the trade-in allowances on electric ranges, with the exact amount dependent upon the individual case.

A retail dealer wishing to take in a usable and salable electric range now may apply to the union for approval of a proposed trade-in allowance. The union indicated that it would be governed in fixing these allowances by the price for which it can be re-sold.

Union representatives also expressed their interest in setting up some special discount allowance to cover complete electric kitchen installations sold through contractors building new homes.

Further negotiations between the union and retail appliance dealers regarding salesmen's salaries will soon be sought by the salesmen's organizations, it was indicated at the meeting.

Existing contracts do not cover salaries or commissions. Union men indicated they would probably ask for some kind of a minimum weekly salary schedule, to be based upon sales quota methods for six-months' periods.

Frigidaire Dept. Store Promotion Mgr. Resigns

DAYTON, Ohio—Resignation of James H. Pickering, department store advertising and sales promotion manager for the Frigidaire division of General Motors Sales Corp., was announced here last week. No replacement will be made in the position at present, it was said.

Federal Refrigerator Co. Sells 'Johnson' Cooler

NEW YORK CITY—Federal Refrigerator Corp., refrigerator remanufacturer, distributor, and parts jobbing firm here, has been appointed exclusive distributor in metropolitan New York City for the Johnson "Space Cooler," reports John Bess, vice president and general manager.

Distribution will be entirely through dealers who are now handling other products manufactured or distributed by Federal.

Below-Cost Sales Bill Signed In Mass.

BOSTON—Gov. C. F. Hurley has signed an "unfair sales act" banning sales below cost, providing for the first time legal means of halting such practices in Massachusetts.

The measure prohibits sales below cost or replacement, whichever is lower, plus a minimum markup of 6% at retail.

York Calls Salary Cut 'Emergency Measure'

(Concluded from Page 1, Column 5)
moved downward while costs have mounted, the York company has been forced to curtail expenses to avoid operating losses and an impairment of capital.

"Under the circumstances," Mr. Shipley said, "we are obliged to again ask you to cooperate with us, as you so willingly did in the last emergency, by accepting reduced compensation until this one has passed.

"We pledge ourselves that as fast as the conditions of our business permit, there will be restorations until our present level is attained."

Schuele Joins Greusel Co.

MILWAUKEE—Al Schuele has been added to the wholesale sales staff of Greusel Distributing Co., distributor of Crosley refrigerators and radios, to contact accounts in the Milwaukee trading area.

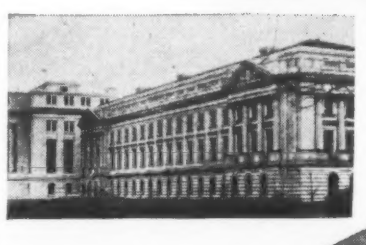
WHEN WASHINGTON SWELTERS

Capitol of the United States. Carrier Corporation, Syracuse, N. Y., *Contractor;* Charles S. Leopold & George Weschler, *Consulting Engineers.* "Freon" air conditioning by Carrier Corporation.

12,000 TONS OF "FREON"*

Library of Congress Addition (right)—Jacobsen Bros., Chicago, *Contractor.* Peerson & Wilson, *Architects and Consulting Engineers.* "Freon" refrigeration for air conditioning by York Ice Machinery Corporation.

Department of Justice Building (left)—G. A. Fuller Co., *Contractor;* I. H. Francis, *Consulting Engineer.* "Freon" refrigeration for air conditioning equipment by York Ice Machinery Corporation.



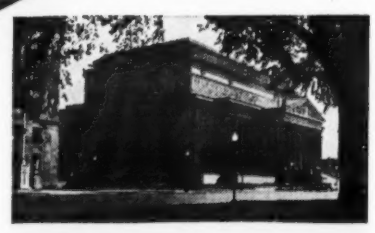
Dep't of Agriculture (Administration Bldg.) (left)—Riggs Distler, *Contractor.* Designed by Nat'l Park Service. Charles Leopold, *Consulting Engineer.* "Freon" air conditioning by Frick Co.

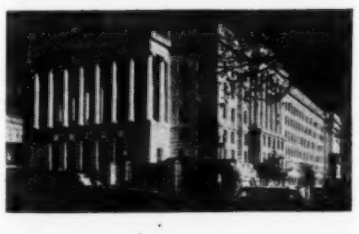
Post Office Building (right)—McCloskey & Co., *Contractor;* Mehring & Hansen, *Sub-Contractors;* Syska & Hennessey, *Consulting Engineers.* "Freon" refrigeration for air conditioning by York Ice Machinery Corporation.

Department of Interior Building (Old) (below)—National Park Service, *Consulting Engineer.* Contractor and manufacturer of "Freon" air conditioning equipment—York Ice Machinery Corporation.

Archives Building (below)—G. A. Fuller Co., *Contractor;* Clyde R. Place, *Consulting Engineer.* "Freon" air conditioning equipment by York Ice Machinery Corporation.

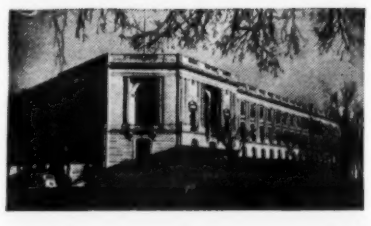
Senate Office Building (above)—G. A. Fuller Co., *Contractor;* Charles S. Leopold & George A. Weschler, *Consulting Engineers.* "Freon" refrigeration by York. Additional air conditioning by Raisler Heating Co.





New House Office Building (left) Pennsylvania Engineering Co. of Philadelphia, *Contractor;* Charles S. Leopold & George Weschler, *Consulting Engineers.* "Freon" air conditioning by Pennsylvania Engineering Co.

Old House Office Building (right)—Pennsylvania Engineering Co. of Philadelphia, *Contractor.* Charles S. Leopold & George Weschler, *Consulting Engineers.* "Freon" air conditioning by Pennsylvania Engineering Co.



AIR CONDITIONING *keep government buildings cool!*

THE world's largest refrigerating machinery installation for air conditioning cools the Capitol group of buildings in Washington, D. C. Six 800-ton York units, using "Freon-12" refrigerant, give it a total capacity of 4,800 tons! Plants in other government buildings in Washington bring the total amount of "Freon" air conditioning to 12,000 tons!

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Commercial Refrigeration

Bakery Engineers Report Refrigerator Keeps Quality Uniform, Increases Profits & Ends Overtime Work

COLUMBUS, Ohio — Use of a dough-retarder refrigerator by the Penny Bakery here has resulted in elimination of night work, leveling out of production schedules, elimination of extra week-end help, more profits from specials, and maintenance of uniform quality, according to a survey made by the bakery engineering department of Tom Russell, here.

Refrigerator used in the Penny Bakery is a Sherer-Gillett "Retardo." Roll doughs have been kept in the unit for as long as 123 hours without crusting, the Russell survey shows.

CAN MAKE VARIETIES

This makes it possible for the baker to make up whatever he needs in the different kinds of sweet rolls, and bake them off when needed. He also can keep extra dough in the unit, for use in filling special orders promptly.

In case of special orders, if the proof box is already at the proper temperature the rolls may be left on the bench until they reach room temperature, which in most cases will not be more than 30 minutes. Should the proof box be cold, the rolls may be placed inside the box for proofing immediately after forming.

In the Penny Bakery, use of the dough retarder unit has made it possible to eliminate all night work, the survey shows. Sweet doughs are mixed during the day, and baked off next morning, changing the baker from a night-time to a day-time worker.

'RUSHING' IS ENDED

By permitting the making up of extra sweet roll dough, the unit also has done away with the necessity of hiring extra help to take care of the week-end baking rush, the survey shows. Buns can be made up during the slow hours of the day, ready for baking when called for.

Data on maximum retarding times for various kinds of doughs also was brought out by the Russell bakery engineering department survey in the Penny establishment.

Retarding of bread dough is practical up to 24 or 26 hours, with a box temperature of 38 to 40° F., the study showed. If refrigerated for longer periods, it was found that the dough starts to crust. Bread dough held in the unit for the above period, however, results in a loaf having better bloom, better color, and a more tender crust, it was discovered.

Cake doughs may be kept in perfect condition for as long as 72 hours in the dough-retarder unit, it was found. This applied either to dough scaled off and in pans, or to the bulk dough.

'SPIKING' THE DOUGH

Bulk doughs can be kept for longer than 72 hours, but in this event they must be "spiked" or rejuvenated with whatever leavening is used originally in the dough. One-fourth of the leavening used in the amount of dough remaining in bulk is added in the "spiking" process.

The leavening is put in a small amount of milk and dissolved, so that it can be added without too much mixing, which would tend to toughen the dough. Adding this extra 25% of leavening makes it possible to carry the dough for another 72 hours, the survey showed.

By this process, the baker can have at all times some of each kind of cake mix on hand, making it possible to solicit extra cake business in addition to speeding up the handling of regular orders.

Cakes experimented with up to this time have been low ratio mixes, the Russell report shows, and since high mixes will hold longer, the process also can be successfully applied to them.

COOKIES KEEP NICELY

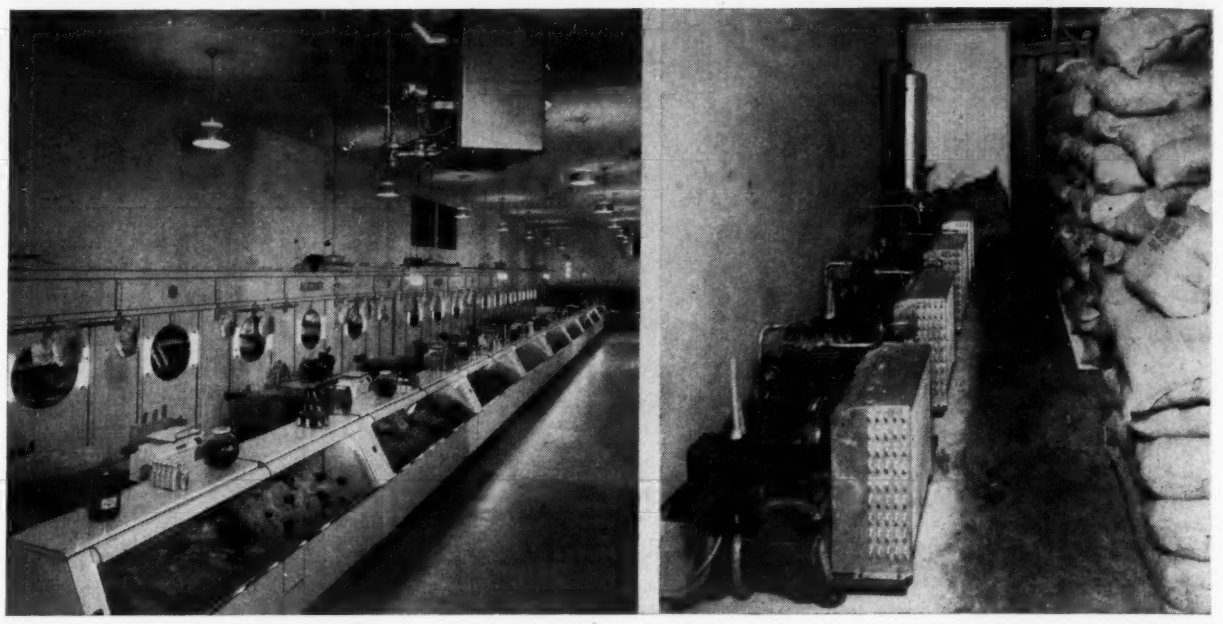
Cookies can be held almost indefinitely in the dough-retarder unit, the survey indicated. The cookies are rolled and cut and put on pans. They need not be proofed, and can be put into the oven at any time after they have set on the bench sufficiently long to attain room temperature. After refrigerating, all cookies show a more tender texture, and coloring likewise will be better.

A cookie batch may be made up and placed in a floured sack, and the sack folded over and placed in the refrigerator. Refrigerated in bulk in this manner, it is possible to greatly increase the unit's capacity, at the same time making it more convenient to fill rush orders.

Puffer-Hubbard Closes For Vacation Period

MINNEAPOLIS — Puffer-Hubbard Mfg. Co.'s plant here will be closed from July 2 to 10 for the annual employe vacation, announces A. L. Goetzmann, manager.

The Latest In Food Store Refrigeration Practice



These two pictures visualize some of the changes that have been made in food store design and refrigeration. At the left is the meat department of a new "super-market" in Dallas, Texas, with its 90 feet of individualized display cases; at the right is the battery of small Brunner compressors that furnish the necessary cooling effect.

* * *

Circulator Introduced For Use on Bottle Coolers

ST. LOUIS—The "Speedster," a water circulator for beverage coolers, which is said to increase cooling speed and reduce cooling time, has recently been put on the market by Walling Appliance Co. here.

The circulator consists of a centrifugal-type pump with a 5 g.p.m. capacity, connected with a 1/15-hp. totally enclosed, waterproof motor, designed for vertical operation with a flexible coupling.

It is claimed the unit can be installed in less than an hour in any wet-bath type beverage cooler having a minimum tank depth of 15 inches. There are no holes to drill, the circulator standing in the water bath and being held rigid against the tank by four sheet metal screws above the water line.

The "Speedster," the maker claims, insures even temperatures in the cooler and brings the contents of the cooler in contact with the coldest water. Brushing effect of the water on the coils and bottles makes for fast cooling, it is said. The device is claimed to increase the cooling capacity from 33 to 50%.

Weight of the circulator is 20 lbs. Overall dimensions of the unit are: height, 14⅞ inches; width, 6 inches; and depth, 5¼ inches.

New Company To Quick-Freeze West Coast Food Products

SAN FRANCISCO — Vacuum Frosted Foods Corp. has been organized here to quick-freeze west coast vegetable and food products under the patents of William Kuster, refrigeration and quick-freezing engineer, and president of the new firm.

Market Offers Display Of All Perishables

DALLAS, Tex.—Ninety feet of meat display counters, 20 feet of produce displays, and 20 feet of display counters for dairy products, all refrigerated by five specially built Brunner compressors, comprise the food refrigeration system which has been installed in the Killingsworth store here by the Ed Friedrich Sales Corp., San Antonio, Tex.

Each counter is specially designed for the type of merchandise it holds, and the compressors were built by Brunner Mfg. Co. to specifications furnished by the Friedrich firm. The store was designed to provide "visual" display of all kinds of perishables.

Three 2-hp. Brunner units handle the major refrigeration requirements, supported by a 2½-hp. and a 1-hp. Brunner machine.

Mr. Killingsworth, owner of the big "master market," reports that the system operates efficiently, quietly, and economically, and that it has reduced spoilage and greatly stimulated trade.

Sherer Converts "Vegetaire" To Dairy Foods Use

MARSHALL, Mich.—A new use for its "Vegetaire" unit, a case originally intended for produce display and storage, nas been developed by Sherer-Gillett Co.

In an increasing number of installations made by dealers throughout the country, the Vegetaire is used in the dairy departments of both super markets and self-service stores.

Conversion of the unit to a dairy case is accomplished by installing a complete baffle and drip pan, and lowering the shelves to horizontal position. The three large-capacity shelves make possible the display of a variety of dairy items, as well as soft drinks of all kinds, it is said.

Because of increasing demand for this type of equipment, the company is planning the addition of a Vegetaire-style dairy case to its line.

Frozen Foods Coiling For Standard Cases Developed By Puffer

MINNEAPOLIS—To provide economical equipment for the storage and sale of frosted foods, Puffer-Hubbard Mfg. Co. here has developed a cold plate coiling system which, if installed in especially insulated bottom compartment of a double-duty case, is said to make the case suitable for use with frozen foods.

In addition to saving the food store operator the cost of special equipment, it is also claimed that the case may be turned back into a standard case by changing of the controls.

Prices for equipping standard Puffer-Hubbard cases for frozen foods use have been announced by the company as follows:

Six-foot case, $110 above regular list price; 8-foot case, $140 above list; 10-foot case, $180 above list; and 12-foot case, $220 above list.

In use, facsimiles of frosted foods packages are displayed on the mezzanine shelf of the case.

New coiling system, the company believes, will find a market in food stores which see a chance for extra profit in the frozen foods business, but which do not want to make the comparatively heavy investment in display equipment which perhaps will not be used during the fresh fruit and vegetable season.

50% of All Foodstuffs To Be Frozen, Birdseye Predicts

NEW YORK CITY — Clarence Birdseye, inventor of the quick-freezing process which bears his name, predicted rapid expansion of the quick-frozen foods industry to cover at least half of the nation's ten-billion dollar perishable food products at a conference held in the Waldorf-Astoria here recently.

The event marked the tenth anniversary of the inauguration of commercial production of frozen food products by Mr. Birdseye. Edwin T. Gibson, president of the Frosted Foods Sales Corp., subsidiary of General Foods Corp., host at the conference, declared that frozen foods are "changing the food habits of the nation."

At least 50,000 retail outlets are potential frozen food distributors, with the future growth of the industry limited only by the development of adequate production and distribution facilities to handle this growing volume, the General Foods president added.

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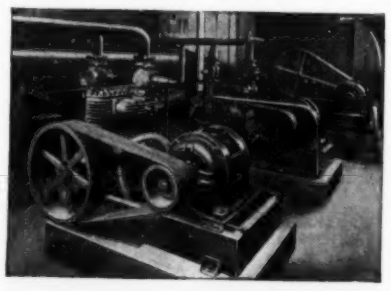
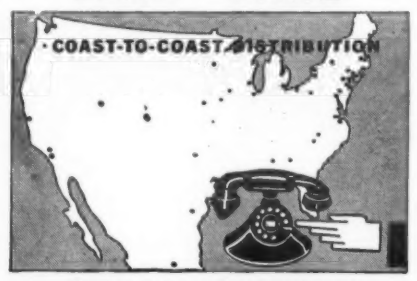
Above: Classroom of the Municipal University of Omaha, Neb., recently completed, is equipped with BAKER SYSTEM Air Conditioning.

Below: Compact BAKER equipment used to air condition the entire University.



ANY TIME



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Air Conditioning

It's Anybody's Business In Chicago, With Little-Known Brands Taking Over 50% of Total Sales Volume

Editor's Note: This is the second article by Mr. Smith, who has been studying trends in the merchandising of air-conditioning equipment. In his first article, published in last week's issue, Mr. Smith pointed out how the growing importance of "little" jobs was making the air-conditioning business more promising for a greater number of dealers.

In this article he analyzes some actual sales figures to show that a great variety of firms, large and small, some with "big names" and some relatively unknown, are getting the air-conditioning business. Surveys show, however, that this great variety of firms is far from doing a good job of contacting the existing market potential.

By Mac Smith, Detroit Merchandising Counselor

AIR-conditioning business seems to be anybody's business. Analysis of sales in Chicago last year shows that 47 manufacturers are getting air-conditioning business in that city. The lesser-known brand names appear on 53% of the tonnage that is being sold, according to data taken from a utility company's report of installations.

The manufacturer's representative who was most active in Chicago, according to this survey, got only 15% of the installations, 27½% of the total tonnage. The first five makes of equipment, from an activity standpoint, went into 55% of the installations and accounted for 47% of the tonnage. On the basis of tonnage rating, the top five sold 41% of the number of installations, for 55% of the tonnage.

MANY BRANDS SHOW UP

However you look at it, there is a lot of business being done on brand names that are little-known to the public, names that the buyer may never have heard of until somebody presented him a proposition on air conditioning.

A breakdown of the market into its major classifications discloses only 12 classifications in which the so-called "major manufacturers" got as much as 50% of the business.

In the biggest single classification of Chicago 1937 installations, general office buildings, representing 11% of the installations and 29% of the tonnage, 20 manufacturers shared in the business. The leader got 25% of the jobs and 27% of the tonnage. The next four got 20% of the jobs, for 12% of the tonnage. The next six each got more than 5% of the tonnage, a total of 1,675 tons. And 10 others shared 25% of the installations, and 4.3% of the tonnage.

Good business activity was thus indicated for at least 10 brands of equipment in this field.

Thirty-four different manufacturers participated in the "Main Street" market—retail stores and restaurants, where 26% of the business was done. In this field the "majors" got 47% of the total business, and the average among the others was 5½ jobs each for a grand total of 1,520 tons.

OFFICES AN EXAMPLE

In the private office field, which is essentially a room cooler market, big names are found on only 48% of the equipment. In doctors' and dentists' offices, the lesser-known brands of equipment got 65% of the business.

This tabulation of Chicago installations by market classifications (shown in Table 1) should be interesting to the man who is interested in knowing which way the air conditioning is going, and where he may find the most natural market for the equipment he is trying to sell. Capitals indicate the market classification dominated by a "Big Five" group of manufacturers in Chicago. The asterisk denotes brackets in which tonnage volume increased during the past year.

These figures show that the widespread publicity given air conditioning as "the next big industry in America" has attracted scores of local as well as national manufacturers who want to be well-established in the business when the big market arrives. This was happening long before the pioneers got out of the red. It is still happening today. Whether it's justifiable or not is not the concern of this report.

FACE THE FACTS

Air conditioning has passed the "novelty" stage and is now well-established as a business, and as a business, it should make money. The way to make it pay is to face market facts as they exist. The Chicago survey shows that a firm or an individual can get a share of the business if they go after it and if they are equipped to handle it.

How the successful air-conditioning man should go after the business has been the subject of numerous dealer surveys conducted by manufacturers and independent research organizations. The answers are legion—political connections, trading agreements, close bidding, quick figuring, prestige, local or national; advertising, formal as well as word-of-mouth; learning about prospects before the other fellow does!

NO SELLING!

Out of all this confusion of contentions, one situation stands out. Very little selling seems to be going on.

A nation-wide survey of 1,200 prospects for air conditioning, people who said they were considering the purchase of air conditioning in 1938, revealed that 79% of their number never once had a sales solicitation from any representative of any air-conditioning concern.

That's something to think about. It would indicate that practically four-fifths of the sales potential hasn't even been scratched. For every man who's being signed up for air conditioning today, four others are waiting for somebody to call on them and tell them something about air conditioning. For every prospect who is looking at competitive bids, there are many times the number who don't even have one dealer's or contractor's price. For every potential customer who has asked for a price, there are countless others who don't buy that way, who are sitting back in the heat, waiting to be sold.

They're anybody's market!

Table 1—Chicago Installations By Market Groups

Percentage of Tonnage Handled By First 5 Brands		Makes Represented	No. of Jobs	Total Tonnage	Average Size, Tons
0	Amusements*	1	1	20.0	20.0
100	BANKS	1	1	5.0	5.0
0	Barber Shops	1	1	0.5	0.5
53	BEAUTY SHOPS	2	5	19.0	3.8
100	BROKERS AND EXCHANGES	1	1	1.0	1.0
86	CLUBS*	3	4	87.5	21.9
35	Doctors and Dentists*	8	25	20.0	0.8
17	Funeral Parlors*	11	16	206.0	12.9
44	Hospitals*	5	5	5.5	1.1
92	HOTELS*	5	5	1,110.0	222.0
100	BAKERIES	1	1	3.0	3.0
100	CANDY	2	3	62.5	20.8
100	PRINTING*	3	5	372.0	74.4
4	Miscellaneous*	5	6	625.0	104.2
44	Offices, General and Buildings*	20	60	2,952.0	49.2
48	Private Offices*	13	125	138.5	1.1
55	RESIDENCES*	15	57	85.5	1.5
41	Restaurants*	30	101	1,619.5	16.0
0	Candy Stores	3	7	26.0	3.7
68	CLOTHING AND DEPT. STORES	9	18	391.75	21.8
24	Drug Stores	8	21	168.5	8.0
17	Food Stores	4	4	30.0	7.5
41	Fur Stores	5	6	24.5	4.1
49	Shoe Stores*	7	27	300.5	11.1
59	MISCELLANEOUS STORES	10	17	283.0	16.7
0	Studios*	1	3	9.0	3.0
82	THEATERS*	8	31	1,735.0	56.0

Cloak-and-Suit Firm Uses Unit Conditioners

NEW YORK CITY—Two 5-ton self-contained air-conditioning units have been installed to cool the wholesale showrooms, model rooms, and general offices of Fierman & Kolmer, suit and cloak manufacturer, as part of an extensive remodeling program.

A total of 2,765 sq. ft. of space will be cooled by these units, one of which will be installed in the office and one in the model rooms. Ducts will carry the conditioned air into the larger display rooms. The units are among the first of their type to be installed in the metropolitan area.

Workers In 'Plane Plant Enjoy Cool Comfort

MIDDLE RIVER, Md.—Both the engineering building and the administration building of the Glenn L. Martin Co., newest additions to the huge aircraft factory here, have been completely air conditioned by the Paul J. Vincent Co. of Baltimore.

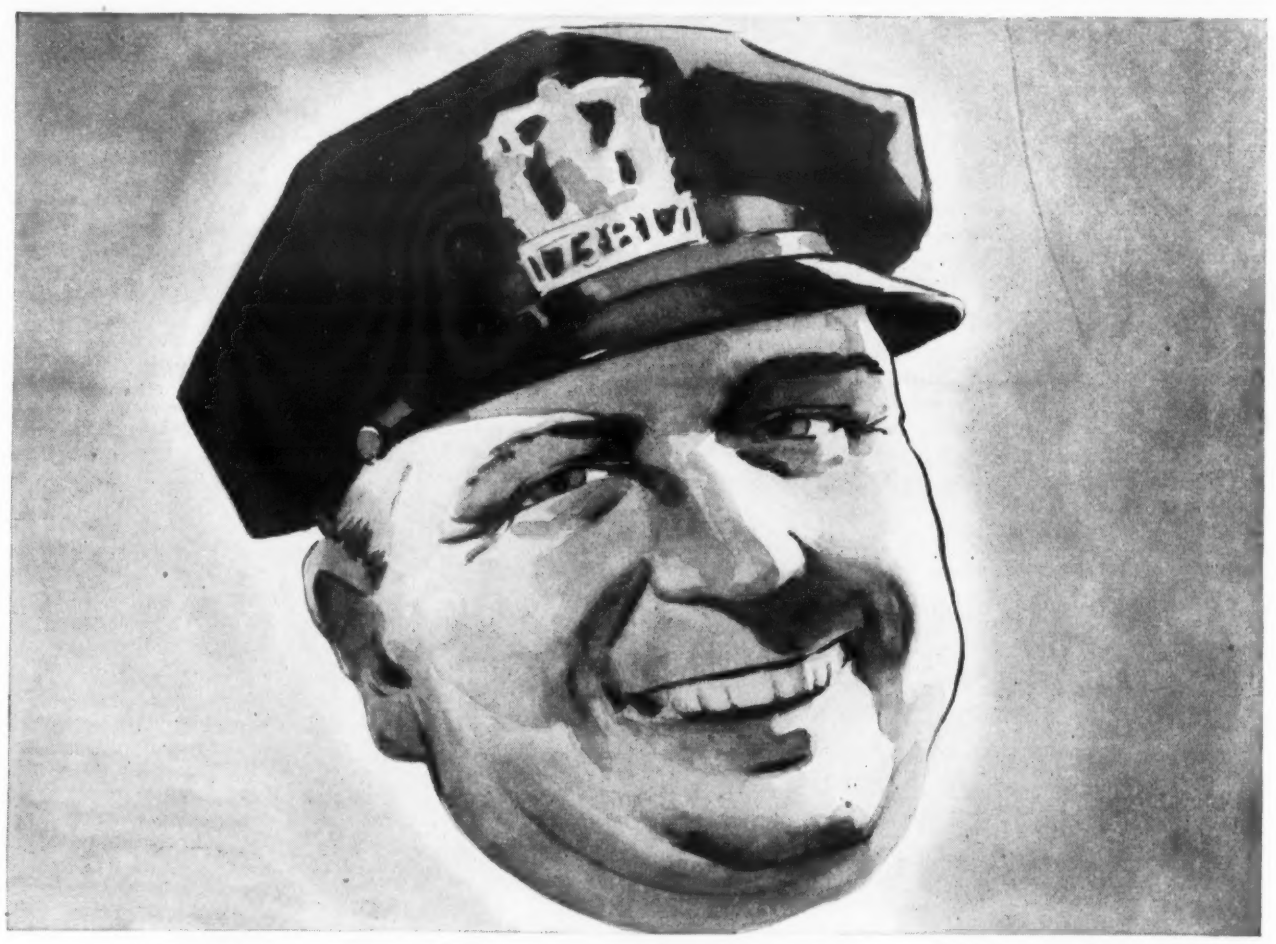
The engineering building is three stories high, in addition to the basement, and each floor covers an area of 23,000 sq. ft. Each floor is divided into four zones which are heated and cooled by two entirely automatic air-conditioning systems.

Two Frick 13¼ x 9 Freon-12 compressors supply the 250 tons of refrigeration used to cool the air in this building. An evaporative condenser on the roof, with fans handling 70,000 c.f.m. of air, is connected to these compressors.

All offices in the administration building, which is only one story high, are conditioned by 20 and 30-ton Frick machines. The same ducts are used for both heating and cooling. This building has an indoor-type evaporative condenser.

In the main assembly plant, where between three and four acres are all under one roof, heating is supplemented by humidifying sprays. When the main fans back of the Leaflee heaters go into action, valves open the feed to the humidifiers.

The first aid room and four offices in the assembly plant are air conditioned with a 10-ton Frick unit. Also in the assembly building is an 8¾ x 6 machine which conditions the cafeteria and dining rooms.



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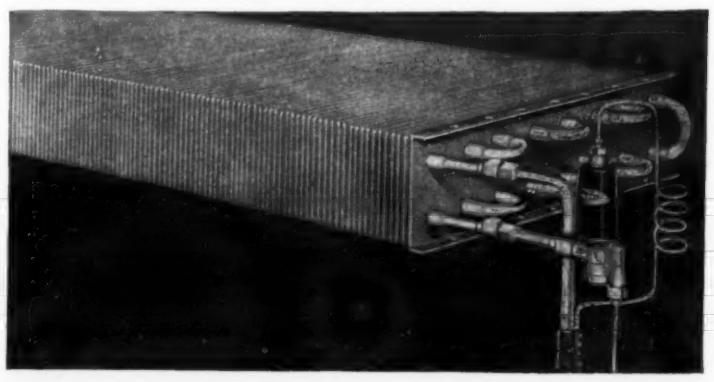

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Commercial Refrigeration

Knowledge of Fundamentals Needed If Estimating Refrigerating Loads Is To Be Done Accurately

STATE COLLEGE, Pa. — Fundamental factors in the estimating of refrigerating loads in which food products are involved were described in a paper prepared by Prof. N. R. Sparks of Pennsylvania State College for the Food Preservation Conference held here last week with the cooperation of the American Society of Refrigerating Engineers.

Prof. Sparks pointed out there exist today a great number of rough, or rule-of-thumb, methods for determining cold storage refrigerating loads. Most of these state simply the tons capacity required per thousand cubic feet of refrigerated space, or, conversely, the space that can be accommodated per ton of capacity.

"All such methods should not be condemned out of hand because of their simplicity," he continued.

BASED ON EXPERIENCE

"They are, after all, based largely upon past experience and experience teaches us most of the things we know. Such faults as exist lie, usually, not so much in the rules themselves as in lack of judgment in their application.

"Rules take into consideration only a very few of the many variables. Thus the fact that Mr. A requires a 5-ton machine for his 5,000-cu. ft. ice cream hardening room in New Orleans is no indication that Mr. B will need 15 tons for his 15,000-cu. ft. fur warehouse on Hudson Bay, and no simple rule should be interpreted as saying that he would.

RULE OF THUMB

"Generally speaking, the rule of thumb may be quite accurate when applied to a case similar in most respects to that from which the rule was orginally derived. They may also be applied with sufficient accuracy to small installations of more or less standard design. But in most cases, other than these, it is worth while to subject the set-up to more accurate analysis.

"From the simplest formula, considering but one variable, we come to various classes of rules which may take into consideration two variables, no more, or the rule ceases to be simple in application. These data are most easily expressed by a family of curves on a single set of coordinate axes of which Fig. 1 is an example.

"Here each curve represents a temperature at which it is designed to hold the refrigerated space. These curves compensate for the facts that the volume of a space increases faster than its external wall area, and that, in general, the lower the temperatures required the greater will be the refrigerating load. Further refinements are impossible without sacrificing the simplicity which is the chief virtue of such methods of calculation.

PROPER APPLICATION

"And yet comparatively accurate determinations of load requirements are possible without the necessity for any calculations which might be classed as complex. Complete data, applicable at will to any case, are available, and need only be properly applied to the specific case in question in order to make possible predictions very near to the truth.

"Engineers making many calculations of a similar nature would probably plot several sets of curves—in this instance, one for each type of heat loss perhaps—in order to avoid the necessity for repetitive calculations. But, for the present, it will be well to investigate the principles without regard to quantity production, and, due to the shortness of time, without being too particular about refinements which may affect the results but little.

"Any refrigerated space is like a leaky ship at sea. Water must be removed from the ship as fast as it leaks in if she is to remain afloat, and heat must be removed from the refrigerator as fast as it leaks in if satisfactory temperatures are to be maintained. There is this difference, however, a badly leaking ship is a faulty ship, while on the other hand, no refrigerator may be built which is impervious to heat absorption from one source or another.

"Heat has been defined as a special form of energy. It is this form of energy which must continually be removed from the cold room by the refrigerating machine in order to prevent its temperature from rising to that of the natural surroundings.

SOURCE OF HEAT

"Now energy, like matter, is, from the engineering point of view, indestructible. Therefore it only remains for us to estimate the energy, mostly in the form of heat, entering a room in order to be able to estimate that to be removed by the machine. This constitutes the refrigerating load. This requires an investigation of the various ways by which heat may be supplied to the cold room. Several independent sources of heat at once become obvious. These are:

"1. The inevitable inflow of heat through walls, ceiling, and floor from a warmer exterior. The quantity of heat so introduced is dependent upon the extent of exposed surface, the type of construction, the kind and amount of insulating material used, and the temperature difference across the walls, ceiling, or floor. The last is influenced by the characteristics of the exterior and interior surfaces and the temperature and state of the media adjacent to these surfaces, i.e., direct contact as with earth or water; still air or air in motion; etc.

"2. The heat which must be removed from the material stored in cooling it to cold room temperature and in maintaining it there. This depends upon the character of the product to be cooled; the amount cooled; the temperature at which the material is introduced to the cold room; the temperature to which the material is cooled, and the vital heat generated within the material.

"3. The heat gained due to changes of air, i.e., the replacement of cold inside air by warm outside air. Air changes may be accidental or incidental, or may be deliberately carried out by means of a ventilating system. In any case the heat gain resulting from the introduction of warm air will be influenced by the weight of air cooled, its initial temperature and humidity, and the temperature to which it must be cooled.

"4. Energy from other sources such as the operation of lights or motors, or persons working within the room.

"The energy so supplied is converted into heat which merely adds proportionately to the refrigerating load.

"If conditions are known, the quantity of heat from each source may be readily evaluated."

PROBLEM OF ESTIMATION

Prof. Sparks then assumed a specific case for which it is desired to estimate the refrigerating load. For this purpose, the assumed specifications of a room will be such as would never be encountered in practice, being chosen rather for the purpose of providing some diversity for the illustration of principles.

There is assumed, then, a room as outlined in Fig. 2 of dimensions 30 feet x 40 feet x 10 feet, in which a temperature of 10° F. is to be maintained. There is one outside wall with a northern exposure. This wall is composed of 8 inch brick, 6 inch corkboard, 1 inch white pine.

East wall, 4 inch regranulated cork between 1 inch white pine each side —10° room adjacent.

South wall, 4 inch Kapok between 1 inch fir—30 feet exposed to 35° room; 10 feet exposed to 85° corridor.

West wall, 4 inch fibrous glass between 1 inch pine.

Floor, 6 inch concrete, 6 inch cork, 2 inch pine. 85° receiving room under.

Ceiling, 8 inch rock wool, 1 inch celotex, and ¾ inch plaster on inside, 1 inch pine and roofing on outside—exposed to direct sunlight.

So much for the room itself. From these data, the net heat received as previously listed under Point 1 may be calculated. The **conductivity** of most materials has been determined experimentally and is widely listed in tabular form. It is expressed in B.t.u. per sq. ft. per inch thickness per degree temperature difference per hour.

CONDUCTIVITIES

A table of those conductivities relevant to this problem is shown in Table 1. It should be noted that these values are subject to some variation, depending upon the condition of the insulating material.

By use of the equation for series heat transmission, an overall coefficient of transmittance or conductance may be determined for a wall of any specified materials. The overall coefficient, "U," in B.t.u./ft.²/°F./hr. is

$$U = 1 \div \left\{ \frac{1}{C_1} + \frac{L_1}{K_1} + \frac{L_2}{K_2} + \frac{L_3}{K_3} \right\}$$

in which "L" is the thickness in inches of one material, "K" is the conductivity, and "C" is the coefficient which may be neglected in calculating the coefficient of materials of low conductance.

FIGURING COEFFICIENTS

We may thus calculate the coefficient for walls, ceiling, and floor. They are, for our case:

North wall, U = 0.0397; east wall, U = 0.062; south wall, U = 0.0595; west wall, U = 0.0555; floor, U = 0.0388; ceiling, U = 0.025 B.t.u./sq. ft./°F./hr.

Now, in order to determine the hourly inflow of heat to the room it is only necessary to multiply each coefficient by its respective area and temperature difference, and to sum these up.

In equation form, the hourly heat supply, "Q," through a given wall is expressed by

$$Q = AU\ (t_o - t_i)$$

where **A** is the area in sq. ft., **U** is the coefficient, and t_o and t_i are the outside and inside surface temperatures, respectively.

SEVERE CONDITIONS

In load calculation it is important that the most severe conditions be used in order to assure ample capacity. Therefore, in this case, the outside air temperature will be assumed as 95° F. This would depend upon the geographical location.

As previously mentioned, the surface coefficients ordinarily have but little influence in a well insulated wall, and the surface temperatures will be assumed equal to that of the air to which they are exposed.

Table 2 shows the completed calculation for heat gain, "Q," through the structure in B.t.u. per hour.

This amounts to 0.744 tons.

Turning our attention now to the commodity, let us suppose that this room may be required to receive, in one lot, 30,000 lbs. of fresh fish at 60° F., and that these will be lowered to 10° F. in 12 hours.

This requires both cooling and freezing, and it will be necessary to know the freezing point, the specific

(Concluded on Page 9, Column 1)

'Rule of Thumb' Methods Are Replaced

There is no "simple" method of estimating refrigerating loads. As Prof. Sparks points out, there are several "rule of thumb" methods, but if the engineer or salesman is to estimate loads correctly, he must know the fundamentals involved.

And if he is well grounded in the fundamental theory of heat-load estimations, he will need but a few key factors to help him complete the calculations, rather than an elaborate estimating form and a thick book full of reference tables.

What Prof. Sparks attempts to do in this article is to point out the fundamental factors involved, and to explain how they can be most quickly and easily determined.

Load Curves

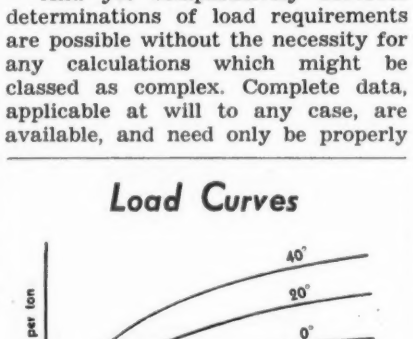

Fig. 1—Curves used in a simple formula for estimating loads, only line variables being involved.

Table 1—Conductivities Of Materials

Conductivities, k	B.t.u. in./sq. ft./°F./hr.
Brick	3.63
Celotex	0.33
Concrete	5.24
Corkboard	0.28
Fibrous glass	0.27
Fir	1.00
Kapok	0.27
Plaster	2.32
Regranulated cork	0.31
Rock wool	0.24
White pine	0.62

Table 2—Heat Gain Calculations

	Area	U	t_o	t_i	Q
North Wall	400	0.0397	95°	10°	1,350
East Wall	300	0.062	10°	10°	0
South Wall	300	0.0595	35°	10°	446
	100	0.0595	85°	10°	446
West Wall	300	0.0555	—15°	10°	—416
Floor	1,200	0.0388	85°	10°	3,500
Ceiling	1,200	0.025	130° (sun)	10°	3,600
Total	....	.....	...	...	8,926

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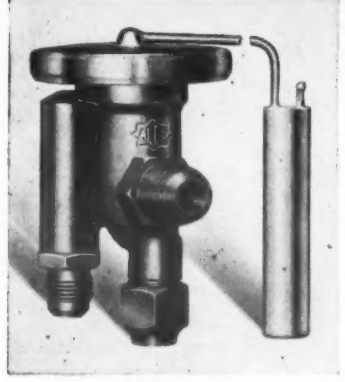

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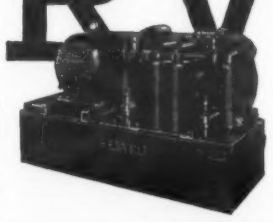

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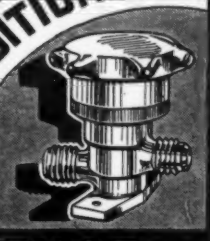

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Basic Factors For Load Estimates

(*Concluded from Page 8, Column 5*)

heat above the freezing point, the latent heat, and the specific heat below the freezing point.

Strictly speaking, these cannot be sharply separated since all the water does not freeze at one temperature, but the following values will nevertheless be taken:

Freezing point = 28° F.

Specific heat above 28° = 0.82 B.t.u./lb./°F.

Latent heat = 105 B.t.u./lb.

Specific heat below 28° F. = 0.45 B.t.u./lb./°F.

The heat to be withdrawn from the fish in the 12-hour period will then be:

	B.t.u.
To cool from 60° F. to 28° F., 30,000 (.82) (32) =	787,000
To freeze, 30,000 (10.5) =	3,150,000
To cool from 28° F. to 10° F., 30,000 (.45) (18) =	243,000
Total	**4,180,000**

If this cooling takes place at a uniform rate, the hourly heat load will be 348,300 B.t.u. or slightly in excess of 29 tons. The importance of the time element in calculation of tonnage is here clearly shown.

AIR CHARACTERISTICS

Before calculating the refrigerating load involved in changes of air within the cold room, it will be well to review air characteristics briefly. We all know that atmospheric air is not a homogeneous chemical compound but is, instead, a mixture composed principally of nitrogen, oxygen, and water vapor, the proportions of each being in the order named. There are also traces of a number of other gases, but the proportion of these is very small.

For engineering purposes, atmospheric air may be considered as having but two constituents—the gaseous components, or **dry air,** and the **water vapor.** The properties of dry air are well known within ordinary ranges of pressure and temperature, as are the properties of water vapor, or steam, and it is only necessary to properly combine the two characteristics in order to evaluate such properties as are desired for the mixture.

PROPERTIES CONSIDERED

The properties useful to us in determining the heat to be withdrawn in cooling a given quantity of air are **total heat** and **specific humidity.** The total heat of the mixture of dry air and water vapor is expressed, for convenience, in B.t.u. per pound of dry air, and the change in this property is, in the case of a cooling process conducted at constant pressure, the heat to be withdrawn.

Specific humidity is the weight of water vapor accompanying one pound of dry air. It is usually expressed in grains, of which there are 7,000 to the pound.

Instead of calculating our data by the use of more or less involved methods, it will be preferable to utilize a psychrometric chart. The use of such charts is permissible when barometric pressures do not vary radically from that on which the chart is based.

We will suppose that the outside air at 95° F. has a relative humidity of 80% and that 3,000 cu. ft. per hour enter the room and are cooled to 10° F. The following data are taken from the psychrometric chart:

Specific volume of the dry air at 95° F., 80% = 14.63 lbs. per cu. ft.

Specific humidity at 95° F., 80% = 202 grains/lb. dry air.

Total heat of mixture at 95° F., 80% = 54.8 B.t.u./lb. dry air.

PROPERTIES CALCULATED

Since few charts read below 20° F., the properties for 10° F. have been calculated. Moisture will freeze out of the air on the brine pipes at a temperature below 10° F. The temperature of the cooling surface will determine the new dewpoint which will be assumed as —5° F. in this case, providing, at 10° F., a relative humidity of 46%. Then:

Specific humidity at 10° F., 46% = 4.2 grains per lb. dry air.

Total heat of mixture at 10° F., 46% = 3.04 B.t.u./lb. dry air.

From these data, the weight of dry air represented by 3,000 cu. ft. may be found as $\frac{3000}{14.63} = 204.5$ lbs.

The hourly energy taken into the room by the air is the weight of air times the total heat of the warm air, or 204.5 x 54.8 = 11,200 B.t.u. per hour.

Similarly, the energy remaining with the air at 10° F. is 204.5 x 3.04 = 622 B.t.u. The heat removed is therefore 11,200 – 622 = 10,578 B.t.u. per hour. Energy also remains, however, in the 5.8 lbs. of ice which has been precipitated on the coils. The total heat of this ice is —161 B.t.u. per lb., or a total of —934 per hour.

The total air-cooling effect must then be 11,512 B.t.u. per hour, or 0.96 tons.

SIMPLE COOLING

It should be stated in passing that this air-cooling load is for simple cooling of the air within the room itself. In a formal ventilating and conditioning system, a large part of this tonnage could be saved by causing an interchange of heat between outgoing and incoming air.

"The only additional heat to be removed in our example is that from miscellaneous sources. It will be supposed that the room has nine 100-watt lamps and a 3-hp. motor for air circulation. The motor with an efficiency of 80%, will require an electrical input of 3.75 hp., or 3.75 (2,544) = 9,560 B.t.u./hr. which is a direct cooling load. The 900 watt lamp input is also a direct load of 900 x 3.415 = 3,075 B.t.u. per hour. The total miscellaneous load is 12,635 B.t.u. per hour, or 1.05 tons.

"Summing up for the total capacity required by this room, it is found to be 31.8 tons.

EFFECTIVE COOLING LOAD

"This, of course, is the actual effective cooling load. The tonnage rating of the machine necessary to provide this effective load would be dependent mainly upon the low and high side temperatures and upon piping losses incurred external to the room itself. For a given applied load, manufacturers can make the necessary corrections and recommend a machine of the proper capacity."

In conclusion, the speaker invited attention to the fact that the purpose of this paper has been to present, in a short space and as simply as possible, the basic concepts underlying the calculation of the essential portion of the refrigerating load. Refinements and complexities were sacrificed to simplicity and brevity. The example is purely illustrative and while the methods are, of course, applicable, the general load proportions and distribution as determined should not be considered as directly referring to any actual case where the conditions may be entirely different.

18 Refrigerator Cabinets For Export Market Are Announced By Midwest Mfg. Co.

GALESBURG, Ill.—Eighteen models of household and commercial refrigerator cabinets, ranging in size from 3 to 84-cu.ft. capacity, have been announced by Midwest Mfg. Co. to export firms throughout the world. Export headquarters of the Midwest company are in Chicago, with Harry J. Scheel as export manager.

The company's line of household cabinets covers nine models which range in capacity from 3.6 to 8.4 cu. ft., two of which were built especially for the export trade. These are EX338, which has a capacity of 3.6 cu. ft. and shelf area of 6.3 sq. ft., and EX438, with a capacity of 4.6 cu. ft. and a shelf space of 8.4 sq. ft.

Other household models include units of 5.8, 6.89, and 8.4-cu. ft. capacity. The last two are also available in deluxe models, with food file baskets, vegetable freshener, butter dish, and water bottle.

Announced to the export trade for the first time is Midwest's line of "knocked down" cabinets, built so that they may be dismantled and shipped in about half the cubic space taken by units of similar size when complete and crated.

Four models, all of commercial size, are included in the "knocked down" series, and have food storage capacities ranging from 44.75 to 84.7 cu. ft., net. Two largest models in this series have either porcelain or Dulux exteriors, while Dulux exterior is standard on the others.

Another feature of the two largest models in this series is their forced convection cooling arrangement, which is claimed to give more uniform temperature and humidity conditions inside the cabinets. Smaller two models are of four-door construction, while the larger two have six doors.

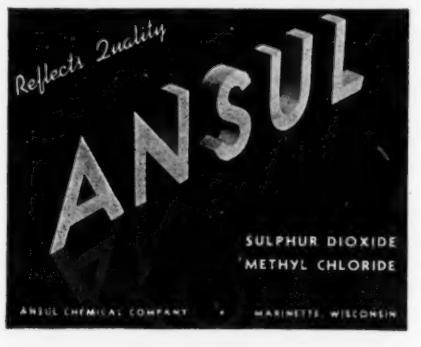
For medium sized commercial installations, the Midwest export line includes models of 13.5, 16, and 19.5-cu. ft. capacities. These models, designated as 138, 168, and 198 in the line, have large ice-making capacities and extra food storage facilities which equip them for use in restaurants, taverns, clubs, schools, dormitories, and large residences.

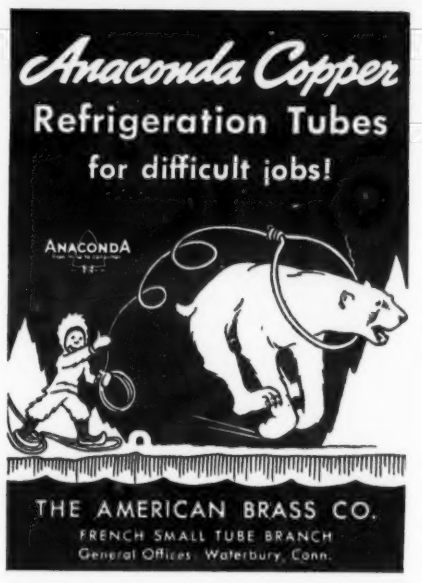
Special door locks are available for all models, where desired.

Also designed for commercial installations are models 32 and 46, which have capacities of 32 and 46 cu. ft., respectively. Four-door models, these units are designed for the larger commercial uses in restaurants, hotels, taverns, etc. Models in this series are equipped with "Flo-E-Fex" cooling units.

Peerless coils also may be used in the units, and special equipment for ice making is available where desired. Also, glass-front doors may be had instead of the standard solid doors, or a full-length door on one side can be furnished. Special door lock for these units also is available.

In addition to the "knocked down" construction feature on some of its cabinets, the company claims additional advantages for the export trade in that (1) Bonderized Dulux exterior finish of the units can withstand severe climatic and humidity conditions in foreign countries; and (2) all wood used in the cabinets is dipped in a special solution which seals it against infiltration of moisture and gives protection against termites.





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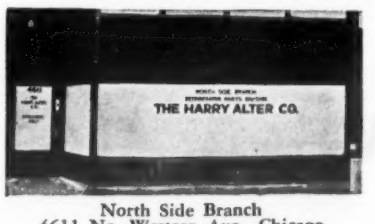

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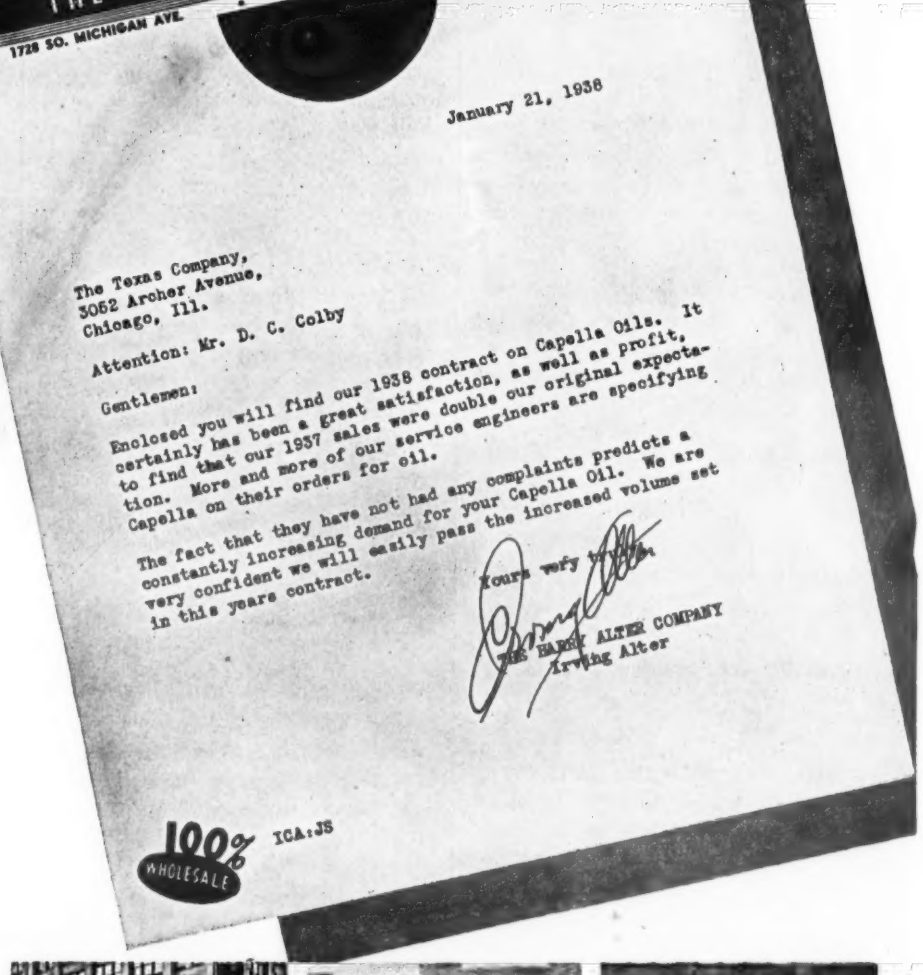
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Management Needs To Chart a Course

IN the last decade, the management of American business and industry has been under fire simultaneously from four different directions—workers, stockholders, consumers, and government.

Workers have been at odds with management over the share of the product received by labor, contending that both managers and stockholders take too large a share of earnings.

Stockholders, voicing discontent over reduced dividends, have been more critical of the compensation of management, and of the quality of management's dealings with labor and government.

Consumers have been increasingly critical of the pricing policies of industry, of the quality of products, and of sales and advertising methods.

Government officials and legislators often have been openly hostile to the manner in which management is discharging its economic and social responsibilities.

Harassed Executives On the Defensive

And management, harried by increased tax burdens and a depressed national economy, has apparently lacked the time, inclination, or ability to organize either defensively or offensively.

Most observers agree that one of the most important tasks of the American business executive today is to demonstrate, in a way that all can understand, that his functions, properly administered, are essential to the equitable adjustment of these conflicting forces. And while they are convinced that millions of people still believe that, by and large, America's business leaders are deserving of confidence, discerning executives recognize that they are faced with two main problems:

Telling Its Story To 'Man In the Street'

First, how is management going to do a better job—provide a greater stability of employment, better wages, higher quality of merchandise and lower cost, and fairer return on capital?

Second, how is management to bring to "the man in the street" an adequate conception of what has been gained in the way of a higher standard of living, higher real wages, greater leisure, through the accomplishments of management under free enterprise?

"Universal education and the common use of machinery have fused a new dynamite of discontent in the world," says William Allen White, famed editor of the Emporia (Kan.) Gazette.

"Unless the wisdom of man can find some fair way to secure exceptional rewards to exceptional men who have organizing talents, and at the same time to establish a universally high standard of living which will satisfy the common man who has only a common talent, we shall have no peace in business or industry. It is a world problem facing modern man . . ."

Men Who Know How —Not Politicians—Required

The "wisdom of man" of which Mr. White speaks is not likely to come from government. No matter what the people may approve at the polls or through their representatives, the jobs of production and distribution still remain—and these are jobs for men who know how to manufacture and sell, not men who know how to woo votes.

Neither are the millions of consumers or workers to be looked to for a final solution of the problem. The responsibility is that of business and industrial leadership—of the relatively few thousand top-flight men to whom has been entrusted the large-scale direction of men, money, and materials. Theirs is the penalty—as well as the power—of leadership.

Upon the wisdom of these men will largely depend the final decision reached by the American people concerning the continuance, modification, or scrapping of the system of free enterprise which has been unique in the world, and which has brought the American people the highest living standards of any race in all history.

Dramatic Presentation of Management's Contribution

Some students of the situation believe that the answer must come from "the top." They feel that a broad understanding of economics, sociology, industry, and government is a prerequisite to the formulation of an adequate program. In brief, their viewpoint might be stated somewhat as follows:

"What we need is a chance to show that this is a world problem, and not one that's bound up exclusively with the American political scene. This question of management and what it means to capital, labor, and consumer deserves study from every angle.

"Let's call a world congress of leading experts in management from all countries to consider and evaluate the social and economic results of our work. Let's have a public swapping of world experience.

"This will give management the opportunity to rededicate itself publicly to the principles that are reducing drudgery, spreading the advantages of management, and promoting the well-being of the peoples of the world."

Management is going to have this chance to explain its story, in the Seventh International Management Congress, which meets in Washington, D. C. from Sept. 19 to 23. Here is a ready-made opportunity for American business and industrial leadership to take an important step in regaining the confidence and approval of the American public.

Looking at the problem from a world viewpoint, those who take part in the Congress will be given an unusual opportunity to discuss and consider such problems as "Management's Responsibilities to Society," "The Continuation of Free Enterprise," "Labor's Aims and Responsibilities," "Common Ground for Labor and Management," "Management's Aims and Responsibilities," and "The Public's Concern in Industrial Harmony," as well as scores of other topics related to the wide field of management.

Pressing Modern Need For Lasting Industrial Harmony

Speakers and discussion leaders will include such leaders in management practice as Harry Arthur Hopf, deputy president, International Committee of Scientific Management; Dr. Karl T. Compton, president, Massachusetts Institute of Technology; Dr. Henry C. Link, secretary-treasurer, Psychological Corp., New York City; Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Mass.; Secretary of Commerce Daniel Roper; and Editor William Allen White.

To throw light on some of the complex and highly controversial questions now facing management will be an accomplishment which cannot be measured in dollars and cents.

If this effort succeeds in *stating the case* and *pointing the way* in terms which can be understood by the average American business man, the Management Congress will be eminently worth while.

They'll Do It Every Time . . . by Jimmy Hatlo

YES, DEAR - NO, DEAR - YES, DEAR - YES, DEAR - VEAL CUTLETS AND STRING BEANS WILL BE ALL RIGHT. YES, DEAR - NO, DEAR - YES —
THAT GUY'S WAR DEPARTMENT SURE PICKS SWELL TIMES TO CALL HIM UP. THE THREE WISE MEN ARE IN FOR A HEAVY CONFERENCE.
YES, I WAS ON THE BOARD YESTERDAY WHEN SHE CALLED AND WANTED HIM TO TALK TO THE BABY JUST WHEN HE WAS TRYING TO CLOSE THE DEAL OF THE YEAR!
JIMMY HATLO
1-4
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LETTERS

Dealers Use News To Sell Locker Storage

Mullen Bros. & Co., Inc.
Engineers & Contractors
1036 Main St.
Dubuque, Iowa

Sirs:

Please send us 10 copies of each June 1 and June 8 issues containing locker plant stories.

These are a real selling piece of literature. We learned through reliable sources that refrigeration dealers are using these two issues as effective sales tools all over the country.

SECRETARY

Successful Merchant Advocates Loyalty to A Single Brand

Landis Electric Co.
121 N. Duke St.
Lancaster, Pa.

Editor:

I have been a constant subscriber and reader of your newspaper since its first issue and it is the only trade magazine we receive that is read by practically every member of our sales and executive department. Most trade publications are only referred to when some definite problem might require it.

It has occurred to me that there is one rather important item that has never received due attention. More reference to it would, I believe, help to promote a gain for everyone.

I refer to "loyalty" to a product. So many dealers have not seen the advantage of sticking to one product or rather one make of product. They handle one make of a major appliance one year and another make the next year. Many times they handle several makes at one time. This does not build public confidence and does not keep the dealer in a good position to service his appliances. It also promotes bad competitive situation for the dealer taking on an appliance that was previously handled by several of his competitors. The former dealers invariably use their knowledge and experience with the former products to sell prospects out of a product rather than into their own product. This is bad for everyone involved including the manufacturer of the product.

We want to say and not in a boastful way that we have represented Kelvinator products exclusively for over 15 years. Naturally some years the product was better than others competitively but we found that by holding on to the one make product we got sales without so much sales effort or expense. It has enabled us to give prompt service since our service men were always familiar with the product and we could very easily stock the parts necessary for prompt service.

Because of our satisfactory experience we should like to see other dealers and distributors be encouraged to be loyal to whatever product they have chosen. Perhaps you could contribute to this encouragement and I know you would be doing everyone a good service. We know from experience that your publication has the confidence of its readers and it takes such a publication that has demonstrated faith to its readers to promote this feeling of loyalty.

Hoping you will encourage this loyalty from time to time, I am

HENRY V. LANDIS, JR.,
President

Australia's Mr. Hansen Arriving In August

F. C. Lovelock Pty., Ltd.
16-20 Young St., Sydney, Australia

Publisher:

Thank you very much for the offer to make the offices of the NEWS my headquarters whilst in the U.S.A. This indeed is appreciated, and in writing to our connections over there I have asked them to mail me direct, care of you. I hope by the next outgoing mail to let you have some rough idea of my itinerary.

As the time draws near for my departure, I am looking forward with much greater interest to making the trip, and to meeting you personally.

F. E. HANSEN

RCA Radiogram

REFRIGERATION NEWS

Itinerary altered. Now leaving Sydney July 22 arriving Chicago Aug. 13, Detroit Aug. 29.

HANSEN

Just Try To Stop This Young Man!

99 Mechanic St., Westerly, R. I.

Sirs:

Inclosed you will find a money order for ten dollars ($10.00) for which please ship to me by express, the whole five books that are listed on page two of the "1936 Master Service Manual." I also ask you to send me the Refrigeration magazine that accompanies these books.

I am 18 years of age and shall be a graduate of the Stonington high school this week. For the past four years, I have been interested in refrigeration and have finally decided to take it up as my trade. For this reason, I am ordering these books in the hope that, after intensive study, I shall be able to work on household refrigerators. I know that it will probably take me about five years, but I am willing to go through with it.

FRANK KENDZIA

P.S. *Nothing can stop me from entering refrigeration.*

Pleasure, Helpful

106 Wallace St.
Red Bank, N. J.

Sirs:

It is a source of real pleasure for me to receive this valuable publication each week and it has been extremely helpful to me, and I would not want to miss a single copy.

GEO. W. OBRE

Air Conditioning

Lithium Chloride Used To Dehumidify Air In 870-Ton Carrier Hotel Job

CHICAGO — Lithium chloride is used as a dehumidifying agent in connection with the 870-ton air-conditioning system installed in the Palmer House hotel here.

Fresh air taken in on the roof of the hotel is passed through a lithium chloride dehumidifying system before it reaches a series of multiple Trane conditioning units.

These conditioning units are unique in that within the one unit that supplies 16 rooms are 16 individual sets of coils, or one set of coils for each room. These coils are six rows deep, five rows for sensible cooling and one row for heating. The four upper pipes, which are made of ½-inch O.D. tubing, supply cold water to the unit, distributing it to each coil section designed for cooling. Hot water is supplied to the lower four small pipes. These pipes are connected to the one-row heating coil.

The coil assemblies are mounted on top of the units, which are placed in closet spaces on the various floors. Round tin ducts were selected to carry the conditioned air to each of the 16 rooms. Each duct leads directly from the individual coil section to the room it serves.

Each individual coil section is under thermostatic control from the room it serves. Thus it would be possible to supply cold water to the coil for one room, while the coil supplying air to another room would be supplied with hot water at the same time. Occupants of each room can obtain the exact temperature desired by thermostatic regulation of the flow of hot and cold water to the coils.

Each individual cooling coil section cools 200 c.f.m. from 85.5° to 61.5°, when supplied with 1.3 g.p.m. of water at 54° entering temperature and 61° leaving.

The one-row heating coils are first in the path of the entering air, and are in the same fin with the first row of the cooling coil. For heating, .66 g.p.m. is circulated at a temperature of 200°. There is approximately a 20° temperature drop on circulation.

Extreme care was taken to construct a sound-proof conditioning unit. To gain the desired acoustical properties, Charles Leopold, of Philadelphia, who was consulting mechanical engineer on the project, suggested the use of two fan-boards in series.

These fan-boards each consist of two 12-inch D. W. D. I. squirrel cage fans which are used in series to overcome the unit and duct resistance at low operating speed—rather than one fan running at high speed with a consequent higher noise level.

Inside of the conditioning unit is lined with perforated metal. Between this metal and the outside wall of the conditioner is 1 inch of balsam wool, which serves as a sound-absorbent material.

Designed by Mr. Leopold, the conditioning system contract was awarded to Carrier Construction Co. of Illinois. Sheet metal work was sublet to Mehring and Hanson Co. of Chicago. Selection of the special Trane conditioning units was with the approval of Mr. Leopold, J. E. Hill, engineer for the Palmer House, and the Carrier Construction Co.

Air-washing systems formerly used for the public rooms were redesigned by Mr. Leopold to operate with Trane water-cooling coils, which were supplied with chilled water from the Carrier centrifugal unit.

5,000 See Exhibition Of Air-Conditioning Units In Chicago

CHICAGO—More than a score of companies displayed their latest equipment for store and home cooling at the electric air-conditioning exposition sponsored by Commonwealth Edison Co. in its air-conditioned assembly hall. More than 5,000 persons attended the exposition, which closed June 4.

Self-contained store coolers, central-station cooling systems, room coolers, and commercial refrigeration equipment constituted the principal displays at the exposition, which was designed principally to appeal to prospective purchasers of commercial and industrial conditioning systems.

Exhibitors at the show included the Airgard Corp., Airtemp Construction Corp., Baker Ice Machine Co., Inc., Carbondale Machine Corp., Carrier Corp., Climax Engineering Co., Delco-Frigidaire Conditioning division, General Motors Sales Corp., Fairbanks, Morse & Co., Frick Co., General Electric Co., General Refrigeration Corp., Howe Ice Machine Co., Ilg Electric Ventilating Co., Indian Products Corp., Kelvinator division of Nash-Kelvinator Corp., Mills Novelty Co., Norge division, Borg-Warner Corp., Pleasantaire Equipment Co., Reliance Refrigerating Machine Co., Inc., Standard Air Conditioning, Inc., Vilter Mfg. Co., Westinghouse Electric & Mfg. Co., X-L Refrigerating Co., and York Ice Machinery Corp.

KEROTEST
Valves and Fittings
The Standard of the Industry
Kerotest Manufacturing Co.
Pittsburgh, Pa.

Sixth Air-Conditioning System Installed For Paralysis Victim

CHICAGO—For the sixth time since he was stricken with infantile paralysis in 1936 in Peiping, China, air conditioning is aiding in the recovery fight of Fred B. Snite, Jr., Chicago's 26-year-old "iron lung" patient.

From his air-conditioned room in Billings Memorial hospital here, young Snite has been moved to an air-conditioned room in his father's home in River Forest, Chicago suburb. A central-type system, with compressor and air-handling equipment installed in the basement, supplies conditioned air to his present quarters.

Conditioning systems have been installed on five other occasions during the youth's illness—in the China hospital, on a cross-continental train, twice in his hospital room here, and in his father's winter home in Miami.

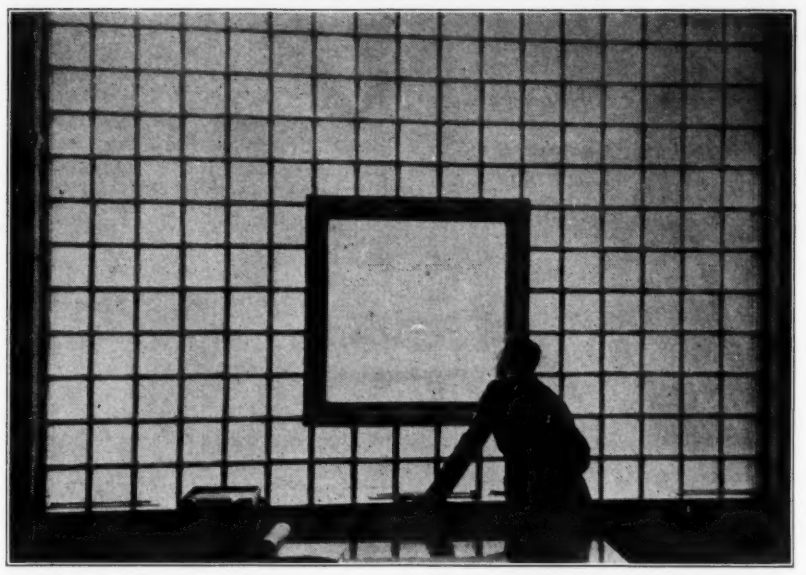
Air Conditioning Helps Sell Lentheric Perfumes

NEW YORK CITY—Air conditioning in the exclusive perfume shop of Lentheric, Inc. not only promotes the physical well-being of customers and employes, but diffuses strong perfume odors and keeps the air free from predominating scents which might confuse customers.

Located in the Savoy-Plaza hotel on Fifth Ave., the Lentheric shop is cooled by a 5-hp. Merchant & Evans condensing unit, which powers a Trane year-around air-conditioning system installed by Independent Utilities, Inc.

Four-row Freon coils are used for summer air conditioning, and a one-row heating coil for winter. The conditioning equipment, installed in the basement below the shop, is unusually well arranged and compact. The system is necessary to correct the heavy lighting load in the building, as well as to supply the building with clean air and eliminate street noise.

Windows In the Glass



Carrier's new Syracuse plant makes large use of glass brick—which is fine for admitting light, but affords no views. President Willis Carrier had a regular window installed in his glass-brick-paneled office, and above you see Advertising Manager Walter Bowe looking out at the weather.

Airtemp Executive Heads Personnel Group

DAYTON, Ohio—Roland Fulton, personnel director of Airtemp, Inc., air-conditioning subsidiary of Chrysler Corp., was elected vice president of the Miami Valley Personnel Association at its annual meeting June 14. Walter Andrews, personnel director of Dayton Power & Light Co., was the retiring president of the group.

West Virginia Utility Completes Two Jobs

PARKERSBURG, W. Va.—Two installations of air conditioning equipment have recently been completed by the Parkersburg division of Monongahela West Penn Public Service Co. One of the systems was installed in Broida's department store, Parkersburg, the other in Murphy's Cafe, Marietta.

Cost of Heating Air Hangar Reduced By Winter System

GRAND ISLAND, Neb. — Heat loss and heating costs are reduced to a minimum in the model hangar of Arrasmith field, the new Grand Island municipal airport, through the use of winter air-conditioning equipment which diffuses the heat within the working space.

The modernistic Grand Island airport is large enough to house the largest transport plane in service, or will accommodate 21 small commercial ships. Complete service facilities are available. The administration building contains a public lounge and airplane directing equipment. The field has one square mile of landing space, with no obstructions within a half mile of the field. Runways equivalent to 30 miles of paved road radiate in various directions.

Due to weather conditions in Grand Island, year-around heating is necessary for the hangars as well as the offices and service department. Heating a hangar was a problem, due to the waste space which would be heated under ordinary systems. Engineers installed Carrier heat diffusers for the hangar, two service departments, administration building, public lounge, and weather bureau.

Indiana Theater Cooled

INDIANAPOLIS — Larsh Sheet Metal Works installed air conditioning in the Vogue Theater, which opened here recently.

AIR CONDITIONING

AUDITORIUM
Announces

ROYALTY RATES
Reduced again

By reason of greatly increased use and acceptance of

AUDITORIUM
AIR CONDITIONING SYSTEMS
Both Central Station and Unit

Auditorium is now able to announce another notable reduction in royalty rates effective June 10, 1938. This reduction closely follows those of 1936 and 1937 and clearly reflects the increased use of these proven systems.

There is no longer any reason why installers of air conditioning systems may not offer their clients the system best suited for their particular conditions and one which can be economically operated.

These installers may, for a small sum, secure the privilege of using any or all Auditorium Patents.

Fill out the coupon below and mail at once.

AUDITORIUM CONDITIONING CORPORATION—17 EAST 42ND ST., N.Y.C.

Please send me by return mail a description of your NEW Plan

Name and Title.....

Firm Name.....

Address.....

AUDITORIUM CONDITIONING CORPORATION
17 EAST 42nd STREET • NEW YORK

AUDITORIUM CENTRAL STATION AIR CONDITIONING UNIT TYPE SYSTEMS

Licensees

American Blower Corporation, Detroit, Michigan
Buffalo Forge Company, Buffalo, New York
Carrier Corporation, Syracuse, N. Y.
Clarage Fan Company, Kalamazoo, Michigan
Frick Company, Waynesboro, Pa.
General Electric, Schenectady, N. Y.
J. O. Ross Engineering Corporation, New York, N. Y.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Manufacturing Company - - - East Pittsburgh, Pa.
York Ice Machinery Corp., York, Pa.

Major Appliances

Facts on Operating Efficiency and Costs Sell Water Heaters, State Salesmen Who Win Prizes

NEW YORK CITY—Three retail salesmen representing utility companies in the eastern and southern sections of the country won the first prize awards in the April contest conducted by the National Electric Water Heating Council of Modern Kitchen Bureau for the best letters telling "How I Sell Electric Water Heaters."

April prize winners were Paul Ashman, Pennsylvania Power & Light Co., Freeland, Pa.; J. K. Matheson, Duke Power Co., Hickory, N. C.; and J. H. Kinzer, Alabama Power Co., Demopolis, Ala.

Excerpts from the letters submitted by the prize winners follow:

"Fundamentally, water heaters are sold in low-rate brackets, so most prospects are present electric range users," Mr. Ashman writes. "The next step is surveying these prospects, getting complete information on present water heating methods, such as fuel used and costs, the cost of present equipment, number in family, and approximate water usage.

"With all those facts, we can readily give an estimate on heating water electrically. In most cases it compares favorably with the old method, not considering the automatic service, with no need of attention at any time.

"You can install an electric water heater and forget it, with no guesswork and no regulating. No running up and down the cellar steps, no fires to light, no flues to clean and the safety feature alone is a big factor, with its insurance against flame type hazards.

"My company also inaugurated a 'before and after' operating cost data sheet, which shows operating cost before installation and after. In other words, using the user, whose testimonials can be used as a sales tool to good advantage.

USE EXISTING SYSTEM

"Where prospects heat water by furnace with an indirect heater in winter and jack stove, or 'bucket a day,' in summer, we recommend using an electric water heater hooked in series with heating system. In this installation the electric water heater acts as a storage tank in normal winter weather, and as a booster heater in mild winter weather. With discontinuance of house heating, the electric water heater automatically cares for the hot water supply.

"Summing it all up, I know of no other service that gives more to a home."

THREE APPROACHES

"I sell water heaters by concentrating on one of three approaches," Mr. Kinzer writes. "If it is a new prospect with no means of heating water, I concentrate my sales talk on the reasonable installation cost, reasonable operating cost and, superiority over other methods of water heating.

"If the prospect is replacing depreciated water-heating equipment, I concentrate on the fact that the electric heater is the modern way, reasonable in cost and cheap to operate, as compared to other methods.

"If the prospect is replacing existing equipment, I try to capitalize on his objection to present equipment, and concentrate on the many advantages of the electric way.

"I find that water heaters are sold more readily when the talk is confined to those facts directly applicable to the individual case. The customer seems to appreciate the elimination of all but pertinent information in my sales talk."

'SLEUTHING' IMPORTANT

"I find it advisable in every electric water heater canvass to do one thing first—and that thing is to find out the type, size, age, condition, virtues, faults, and any other information that might give me a case to present against the present system used," says Mr. Matheson.

"This information I try to get before any selling talk is given, before any prices are quoted, and before any invitation is given to buy.

"This information must be gotten without antagonizing the prospect, and his sales resistance must not be aroused too much. The reason I want this information is that I want to talk to him seriously about a method of water heating that is newer and better.

"I find that it is absolutely necessary to be familiar with all types of water heaters in order to fairly and honestly discuss their values and faults with a prospect.

"Children and cooks and neighbors are excellent sources of information concerning hot water problems. I have had kids come right up with the information that had seemed to me so hard to get.

"I am sold thoroughly on absolute familiarity with all types, so that I can make the proper presentation of my own type."

'Selective' Selling Helps Indianapolis Dealer

Ralph F. Fisher (right), Indianapolis dealer who sold more than 250 major appliances last year and who is likely to better that record this year, has a rather simple formula—select prospects who can afford to buy good merchandise, contact them personally, and above all, sell them while they're hot. He maintains a modern showroom, featured by the use of trick lighting effects. In the above picture he is in action giving a "part by part" sales story on an electric range.

Department Store Survey Shows Customers' Preferences In Appliance Labeling & Instructions

NEW YORK CITY—How to use and how to care for electrical appliances is the information most desired by consumers on informative labels placed on these products, according to the preliminary report of the survey on merchandise labeling which has been conducted by the merchandising division of the National Retail Dry Goods Association.

This survey, in which stores were asked to indicate the points that should be covered by informative labels used on various types of merchandise, from the standpoint of questions asked about this merchandise by customers, showed that 77% of the stores wanted information on the care of appliances, while 72% of the outlets requested instructions as to the use of the product.

Next in importance, according to results of the survey, is information on the construction of the appliance, for 49% of the stores desired this. Instructions for cleaning the appliance and a statement of the purposes for which the article is intended each were requested by 32% of the stores.

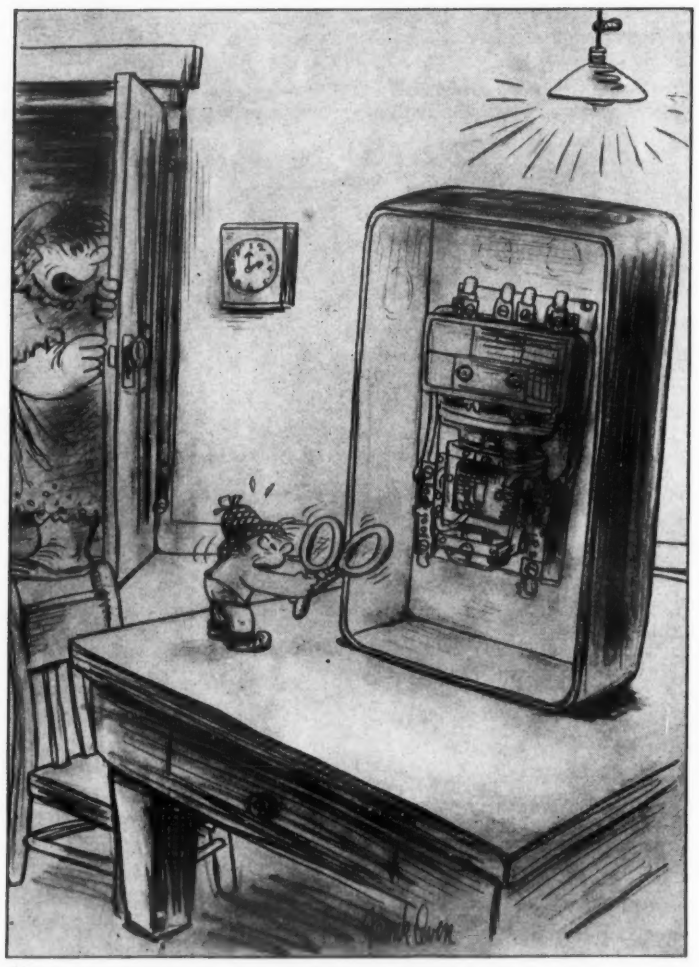
Demand for other information ran as follows: grade and quality, 25%; material content 19%; size, 13%.

NAME ON LABEL

The matter of whose name should appear on the label—store, manufacturer's or brand name—was not put separately for each class of merchandise, but was asked as a general question applicable to all merchandise. A double set of replies was requested, one showing the preference of the customer, the other the preference of the store.

Customer preference was reported as follows: brand name, 36%; store name, 33%; no interest in name, 27%; manufacturer's name, 4%. Preference of the stores, themselves, was: store name, 43.5%; brand name, 41.3%; no interest in name, 9.5%; manufacturer's name, 5.7%.

Retailers, this report indicates, are far more interested in the name on the label than are their customers, but both stores and consumers prefer either the store or brand name on labels.



Bulletin 709 Solenoid Starter

"Come to bed! Even Sherlock Holmes couldn't find trouble in there!"

Do you want motor control that runs—day in and day out—without contact maintenance? Does freedom from sticking bearings, broken jumpers, and switch failures interest you?

Then standardize on "simple" motor starters! Keep away from motor control that is complicated and full of trouble-breeding gadgets. One look at Allen-Bradley solenoid control reveals its simple switching mechanism. And a few months of service proves its "trouble-free operation."

You never need to file or dress the double break, silver alloy contacts. Out of sight is out of mind when you install these amazingly simple starters.

Installation is unusually easy. There is ample wiring space, plenty of knockouts, and self-illuminated white interiors. Is it any wonder that Allen-Bradley solenoid starters are used everywhere on refrigerating equipment?

SEND FOR "THE STORY OF THE SOLENOID STARTER"

Allen-Bradley Co., 1313 S. First St., Milwaukee, Wis.
Please send me "The Story of the Solenoid Starter."
NAME_____ COMPANY_____
ADDRESS_____

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL

New Westinghouse Range For Middle Incomes

MANSFIELD, Ohio—The "Princess," a new and popularly priced electric range model, has been added to the regular 1938 line produced by Westinghouse Electric & Mfg. Co.

Also known as model PK-64, this range claims many new features, including three-heat Corox surface units, a well-type "economy cooker," and a solid one-piece platform and backsplasher construction.

The large oven has lock-stop racks, two oven units, and is equipped with an enameled broiling pan.

Switches for the range units are numbered to indicate which unit they control. A utensil storage drawer is located under the surface units.

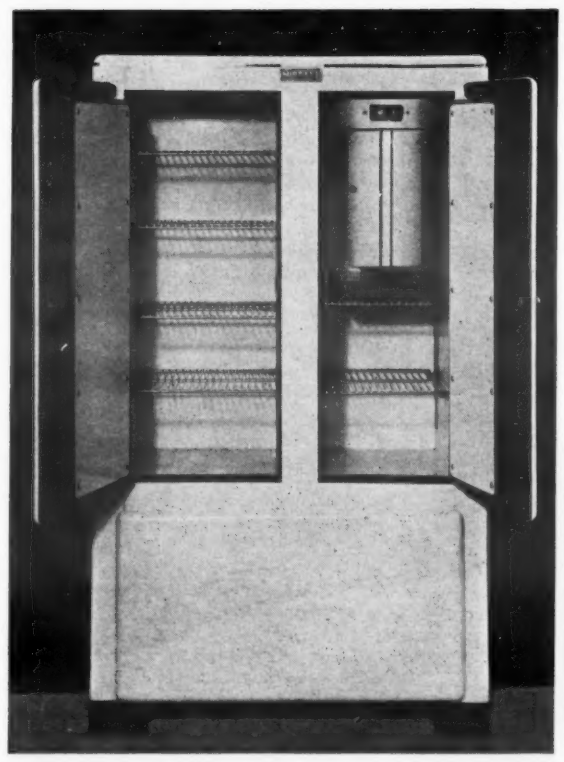
Other features include an oven pilot light, a crumb tray and a broiler stop on the oven door.

94,666 Vacuum Cleaners Sold During May

CLEVELAND—Sales of electric vacuum cleaners during May totaled 94,666 units, compared with 112,100 in April and 168,609 in May of last year, reports C. G. Frantz, executive secretary of Vacuum Cleaner Manufacturers' Association.

Sales for the first five months of this year were 560,848 units, as against 835,398 in the same period of 1937, Mr. Frantz said.

Specify MIDWEST Cabinets



"138"
NET—13.5 CU. FT.

"168"
NET—16 CU. FT.

"198"
NET—19.5 CU. FT

DISTRIBUTORS! GOOD TERRITORIES STILL OPEN!

To "live" commercial refrigeration distributors there are still a few good territories open. If interested, write or wire immediately. The Midwest line is gaining in popularity from coast to coast. No drastic quotas demanded. *Increase your profits* with a line that is *manufactured—not* just assembled—in one of the most modern cabinet manufacturing plants in the United States.

MIDWEST MFG. COMPANY-Galesburg, Illinois
SUCCESSOR TO MIDWEST STAMPING & ENAMELING CO.

Export Sales Office, 330 S. Wells St., Chicago. Cable Address, MIDWEST-CHICAGO

Sales Figures

183,870 Household Electric Refrigerators Sold In May, 1938, By 17 Member Manufacturers of Nema

The following 17 member companies of the Refrigeration Division of the National Electrical Manufacturers Association (Nema) reported household refrigerator sales for May, 1938: Apex Electrical Mfg. Co., Crosley Radio Corp., Edison General Electric Appliance Co., Inc., Fairbanks, Morse & Co., Frigidaire Corp., General Electric Co., Gibson Electric Refrigerator Co., Johnson Motors Co., Kelvinator Div. Nash-Kelvinator Corp., Leonard Div. Nash-Kelvinator Corp., Norge Div. Borg-Warner Corp., Sparks-Withington Co., Stewart-Warner Corp., Sunbeam Electric Mfg. Co., Uniflow Mfg. Co., Universal Cooler Corp., and Westinghouse Electric & Mfg. Co.

Merchant & Evans Co. did not report.

The sales of the reporting companies do, however, include units manufactured for the following concerns: Montgomery Ward & Co., Potter Refrigeration Corp., and Sears, Roebuck & Co.

SALES FOR MAY, 1938	Domestic	Canadian	Other Foreign	Total World
Lacquer (Ext.) Cabinets Complete				
1. Chest	213	1	29	243
2. Less than 3 cu. ft.	2	594	106	702
3. 3 to 3.99 cu. ft.	3,586	43	1,360	4,989
4. 4 to 4.99 cu. ft.	23,161	2,138	2,370	27,669
5. 5 to 5.99 cu. ft.	35,289	1,430	1,436	38,155
6. 6 to 6.99 cu. ft.	67,598	908	485	68,991
7. 7 to 7.99 cu. ft.	13,542	113	337	13,992
8. 8 to 9.99 cu. ft.	5,933	52	227	6,212
9. 10 to 12.99 cu. ft.	90	...	...	90
10. 13 cu. ft. and up	8	...	...	8
11. Total Lacquer	149,422	5,279	6,350	161,051
Porcelain (Ext.) Cabinets Complete				
12. Up to 4.99 cu. ft.	484	11	23	518
13. 5 to 5.99 cu. ft.	2,772	97	86	2,955
14. 6 to 6.99 cu. ft.	6,908	17	63	6,988
15. 7 to 7.99 cu. ft.	2,412	7	47	2,466
16. 8 to 9.99 cu. ft.	1,649	6	112	1,767
17. 10 to 12.99 cu. ft.	218	1	12	231
18. 13 cu. ft. and up	357	6	74	437
19. Total Porcelain	14,800	145	417	15,362
20. Total—Lines 11 and 19	164,222	5,424	6,767	176,413
21. Separate Systems ¼ hp. or less	147	322	1,418	1,887
22. Separate Household Evaporators	2,816	566	2,188	5,570
23. Total—Lines 20, 21, and 22	167,185	6,312	10,373	183,870
24. Condensing Units ¼ hp. or less	621	264	2,545	3,430
25. Cabinets—No Systems	45	3	9	57
Index Value* of Total Dollar Sales	67.0	137.2	81.1	68.6

*Based on weighted sales for 1934, 1935, and 1936.

New York Leads State Sales In May & For 5-Month Period

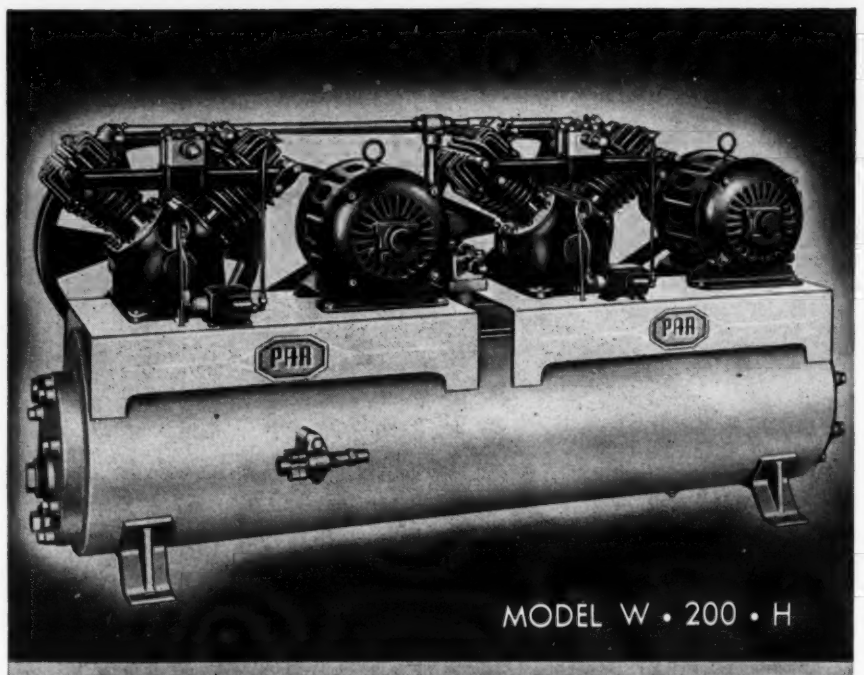
States and Territories	Quantity Household Low Sides May	Cumulative
Alabama	1,575	7,626
Arizona	367	2,159
Arkansas	805	4,772
California	14,259	52,048
Colorado	1,553	5,817
Connecticut	2,298	10,885
Delaware	376	1,508
District of Columbia	1,966	8,725
Florida	1,521	7,440
Georgia	1,836	9,177
Idaho	616	3,093
Illinois	15,630	67,754
Indiana	4,384	19,637
Iowa	3,072	15,609
Kansas	2,002	10,054
Kentucky	2,422	10,197
Louisiana	1,822	10,006
Maine	1,255	3,185
Maryland	2,088	9,499
Massachusetts	6,805	29,273
Michigan	6,760	29,541
Minnesota	4,976	20,627
Mississippi	805	4,117
Missouri	3,917	23,373
Montana	397	2,026
Nebraska	1,284	6,383
Nevada	267	972
New Hampshire	528	1,855
New Jersey	6,036	28,899
New Mexico	301	1,557
New York	21,159	87,799
North Carolina	3,206	15,163
North Dakota	419	1,718
Ohio	8,570	40,278
Oklahoma	1,285	9,747
Oregon	1,443	6,212
Pennsylvania	15,737	72,579
Rhode Island	655	3,043
South Carolina	1,536	6,434
South Dakota	478	2,058
Tennessee	2,326	12,473
Texas	6,795	36,890
Utah	1,386	4,980
Vermont	484	1,853
Virginia	2,021	12,456
Washington	1,946	12,390
West Virginia	1,477	7,712
Wisconsin	4,062	17,303
Wyoming	277	1,004
Total United States	**167,185**	**759,906**
Canada	6,312	23,302
Other Foreign (Incl. U. S. Possessions)	10,373	56,041
Total For World	**183,870**	**839,249**

24,958 Commercial & Air-Conditioning Systems Sold In May To Distributors & Dealers By 14 Companies

The following report of commercial refrigerating and air-conditioning equipment sales for May, 1938 was made to the Commercial Refrigeration Section of the National Electrical Manufacturers Association (Nema) by the following 14 companies:

Brunner Mfg. Co., Carrier Corp., Crosley Radio Corp., Frigidaire Corp., General Electric Co., Gibson Electric Refrigerator Co., Kelvinator Div. Nash-Kelvinator Corp., Merchant & Evans Co., Norge Div. Borg-Warner Corp., Servel, Inc., Uniflow Mfg. Co., Universal Cooler Corp., Westinghouse Electric & Mfg. Co., and York Ice Machinery Corp.

SALES FOR MAY, 1938	Domestic Quantity	Domestic Value	Canadian Quantity	Canadian Value	Other Foreign Quantity	Other Foreign Value	Total World Quantity	Total World Value
1. Bottle Water Coolers—Complete	414	$ 26,438	6	$ 402	33	$ 2,529	453	$ 29,369
2. Pressure Water Coolers—Complete	1,922	193,377	5	438	83	8,119	2,010	201,934
3. Water Coolers—Low Side Only	76	9,198	1	54	5	213	82	9 465
4. Ice Cream Cabinets—Complete	4,215	642,617	544	64,167	192	21,208	4,951	727,992
5. Ice Cream Holding Cabinets Only (Remote)	422	54,696	5	784	7	903	434	56,383
6. Bottled Beverage Coolers—Complete	4,375	434,102	251	22,396	477	39,555	5,103	496,053
7. Beverage Coolers (No High Sides)	74	7,387	....	....	9	596	83	7,983
8. Milk Coolers—Complete	18	2,972	....	....	1	180	19	3,152
9. Milk Cooling Cabinets (No High Sides)	1	57	....	....	....	....	1	57
10. Self-Contained Air Conditioners Air Cooled—All Sizes	1,307	256,709	23	4,715	20	3,680	1,350	265,104
11. Self-Contained Air Conditioners Water Cooled—Under 2 Hp.	218	51,272	....	....	30	6,141	248	57,413
12. Self-Contained Air Conditioners Water Cooled—2 Hp. and Up	627	348,881	4	2,368	12	6,989	643	358,238
13. Air Conditioners—Central Stations 5-Ton Capacity and Over	125	72,484	....	....	1	1,460	126	73,944
14. Air Conditioners—Floor Type (No High Sides)	111	45,028	....	....	18	8,661	129	53,689
15. Air Conditioners—Ceiling (Cooling Only—No High Sides)	248	38,872	....	....	64	6,898	312	45,770
16. Air Conditioners—Ceiling Type (Equipped for Heating—No High Sides)	41	19,714	....	64	7	3,920	48	23,698
17. Air Conditioners—Residential Type (No High Sides, Boilers, or Furnaces)	56	12,735	....	....	28	6,300	84	19,035
18. Condensing Units Less Than ⅓ Hp.	2,026	95,151	106	5,741	382	22,114	2,514	123,006
19. Condensing Units—⅓ Hp.	2,775	207,026	69	5,622	328	27,892	3,172	240,540
20. Condensing Units—½ Hp.	1,482	149,953	59	6,397	197	20 260	1,738	176,610
21. Condensing Units—¾ Hp.	841	114,503	26	3,798	76	10,972	943	129,273
22. Condensing Units—1 Hp.	465	72,148	25	3,786	55	10,197	545	86,131
23. Condensing Units—1½ Hp.	379	75,335	8	1,765	35	7,697	422	84,797
24. Condensing Units—2 Hp.	173	40,140	2	511	20	4.620	195	45,271
25. Condensing Units—3 Hp.	135	40,454	6	1,620	46	10.258	187	52,332
26. Condensing Units—5 Hp.	113	49,105	....	....	9	4,017	122	53,122
27. Condensing Units—7½ Hp.	65	41.688	....	....	7	4,578	72	46,266
28. Condensing Units—10 Hp.	63	48,219	....	....	11	8,263	74	56,482
29. Condensing Units—15 Hp.	57	52,353	1	902	2	1,818	60	55,073
30. Condensing Units—20 Hp.	27	28,772	....	123	5	5,622	32	34.517
31. Condensing Units—25 Hp.	25	35,070	1	1,283	....	....	26	36.353
32. Condensing Units—30 Hp.	24	37,674	....	200	....	....	24	37,874
33. Condensing Units—40 Hp.	24	44,532	....	190	1	1,570	25	46,292
34. Condensing Units—50 Hp.	26	60,708	....	....	4	7,600	30	68 308
35. Total—Lines 18 to 34 Inclusive	8,700	1,192,831	303	31,938	1,178	147,478	10,181	1,372,247
36. Total—Lines 1, 2, 4, 6, 8, 10, 11, 12, 35	21,796	....	1,136	....	2 026	....	24,958	....
37. Commercial Evaporators (Not Reported Above)	3,350	120,874	203	6,365	1,464	36,203	5,017	163,442
38. Air-Conditioning Evaporators (Not Reported Above)	243	55,227	....	....	4	312	247	55,539
39. Total Commercial & Air Conditioning	....	$3,585,471	....	$133,691	....	$301,345	....	$4,020,507



PAR AIR CONDITIONING UNITS

— are made in four popular sizes, from 7-1/2 to 20 horsepower. The 15 and 20 horsepower models are equipped with dual pumps and motors, with balanced crankcase pressures. Control setting for individual operation, automatically operates one or both units depending on load.

OUTSTANDING FEATURES

- Large capacity, slow speed, four-cylinder compressors
- Hardened and ground crankshaft-driven compressors
- Three-ring pistons—two compression, one oil ring
- Bullseye sight oil gauges in crankcase
- Compressor valves in removable valve plate
- Cleanable fin tube and shell condensers
- Welded saddles and feet—very rigid
- Dual controls and motor starters
- Receiver capacity over 1,000 pounds on models 150-200
- Built-in convenient motor adjustment

There are six compressor bodies and twenty-eight complete high-sides in the Par line, in a range of sizes from ¼ to 20 horsepower.

Write TODAY FOR THIS FREE CATALOG!

MODERN EQUIPMENT CORP., DEFIANCE, OHIO

SEE THE PAR UNITS NOW ON DISPLAY AT YOUR NEAREST JOBBER

Albany, New York Melchior, Armstrong, Dessau Co.
Akron, Ohio Percy G. Hanson
Atlanta, Georgia Bowen Refrigeration Supplies, Inc.
Baltimore, Maryland Melchior, Armstrong, Dessau Co.
Birmingham, Alabama Refrigeration Supplies Distributor
Boston, Massachusetts Melchior, Armstrong, Dessau Co.
Brooklyn, New York Melchior, Armstrong, Dessau Co.
Buffalo, New York Root, Neal & Co.
Charleston, W. Virginia Air Conditioning & Refrigeration Sup., Inc.
Chicago, Illinois H. W. Blythe Co.
Cincinnati, Ohio Merkel Brothers
Cleveland, Ohio Debes & Co.
Columbus, Ohio Hughes-Peters Co.
Dallas, Texas The Electromotive Corp.
Davenport, Iowa Republic Electric Co.
Dayton, Ohio W. H. Kiefaber Co.
Denver, Colorado Refrigeration Service Co.
Detroit, Michigan W. C. DuComb Co., Inc.
Des Moines, Iowa Dennis Refrigeration Supply Co.
Flint, Michigan Shand Radio Specialties
Ft. Worth, Texas McKinley Refrigeration Supply
Greensboro, N. Carolina Home Appliance Serv. Co.
Harrisburg, Pennsylvania Melchior, Armstrong, Dessau Co.
Houston, Texas D. C. Lingo Co.
Indianapolis, Indiana F. H. Langsenkamp, Inc.
Jacksonville, Florida The Jamita Co.
Kansas City, Missouri Forslund Pump & Machinery Co.
Long Beach, California Refrigeration Supply Distributors
Los Angeles, California Refrigeration Parts Exc. Refrigeration Supply Dis.
Louisville, Kentucky S. W. H. Supply Co.
Macon, Georgia Lowe Electric Co.
Madison, Wisconsin Gustave A. Larson Co.
Memphis, Tennessee United Refrigeration Supply Co.
Milwaukee, Wisconsin Refrig'ation Specialty Co.
Minneapolis, Minnesota Refrigeration & Industrial Supply Co.
Montgomery, Alabama Teague Hardware Co.
Newark, New Jersey Melchior, Armstrong, Dessau Co.
New Orleans, Louisiana The Spangler Co.
Newport News, Virginia Noland Company
New York City, N. Y. Melchior, Armstrong, Dessau Co.
Oklahoma City, Oklahoma Mideke Supply Co.
Omaha, Nebraska Interstate Machinery & Supply Co.
Oshkosh, Wisconsin Gustave A. Larson Co.
Peoria, Illinois R. E. Thompson Co.
Philadelphia, Pa. Melchior, Armstrong, Dessau Co.
Pittsburgh, Pa. William Orr Company
Phoenix, Arizona Refrigeration Supply Dis.
Portland, Oregon Refrigerative Supply Co.
Richmond, Virginia A. R. Tiller, Inc.
Rochester, New York Melchior, Armstrong, Dessau Co.
Rockford, Illinois Gustave A. Larson Co.
Sacramento, California Hinshaw Supply Co.
San Francisco, California California Refrigerator Co.
Seattle, Washington Refrigerative Supply Co.
Shreveport, Louisiana Interstate Electric Co.
Sioux City, Iowa Refrigeration Supply Co.
South Bend, Indiana F. H. Langsenkamp, Inc.
Spokane, Washington Ditlevson & Evans
Springfield, Illinois Springfield Refrigeration Supply Co.
Springfield, Mass. Melchior, Armstrong, Dessau Co.
St. Louis, Missouri The Spangler Co.
Tampa, Florida Bowen Refrigeration Supplies Co.
Toledo, Ohio Heat and Power Engineering Co.
Tulsa, Oklahoma Machine Tool & Supply Co.
Washington, D. C. Melchior, Armstrong, Dessau Co.
Waterloo, Iowa Winterbottom Supply Co.
Wichita Falls, Texas United Electric Serv. Co.
Toronto, Canada (Ont.) Railway & Engineering Specialties, Ltd.
Montreal, Quebec, Canada Railway & Engineering Specialties, Ltd.
Winnipeg, Man., Canada Railway & Engineering Specialties, Ltd.

MODERN EQUIPMENT CORPORATION
DEFIANCE • OHIO • U • S • A

Jobber Activities

Parts Manufacturers Explain New Developments At Monte Carlo Party Given By Binder

NEWARK, N. J.—Three hundred and fifty northern New Jersey dealers and service men attended the "Monte Carlo" party held here recently by the T. W. Binder Co., refrigeration and air-conditioning supplies jobber.

T. W. Binder, president of the company, was in charge of the meeting. Speakers were Israel Kramer, vice president of Trenton Auto Radiator Works, who discussed recent heat transfer developments in connection with Kramer coils and air-conditioning equipment; A. C. Homeyer of Ranco, Inc., who spoke on controls and their evolution; and Lester Dunn of McIntire Connector Co., who discussed various refrigeration filter materials and drying agents in common use today, and recommended their application.

A. C. Schellenberg, general sales manager of Alco Valve Co., St. Louis, gave an illustrated lecture on expansion valves.

New developments shown at the meeting included the Kramer "Freezing Oven," a low-temperature cold diffuser with provision for electrical heat defrosting; and the Alco multi-outlet valve, a thermostatic expansion valve with provision within the valve itself for equal distribution to evaporator coils with several passes or circuits.

Following the formal talks, group discussions and inspection of the various products displayed were held. Refreshments were served.

In the "Monte Carlo" part of the meeting, each guest was given a roll of stage money and a chance to try his luck at the several gambling devices provided. At the party's end, prizes were given to the "economic royalists" with the biggest bankrolls.

Dennis Named President Of Midwest Supply Jobbers Group

DES MOINES, Iowa—C. W. Dennis of the Refrigeration Supply Co., Sioux City, Iowa, and the Dennis Refrigeration Co., Des Moines, was elected president of the Midwest Refrigeration Supply Jobbers Association for the coming year at the organization's meeting in Hotel Fort Des Moines here June 19.

E. L. Bengston, manager of the refrigeration supply department of Republic Electric Co., Davenport, Iowa, was elected secretary-treasurer of the organization. The men will hold office until July, 1939.

Speakers and Host At Party For Servicemen

When the T. W. Binder Co., Newark refrigeration supplies jobber, held a "Monte Carlo" night recently, some 350 service engineers and dealers turned out for the affair, which combined fun with an educational program. Manufacturers' representatives were present also, and those in these candid pictures taken at the affair are A. C. Homeyer, Ranco, Inc.; Israel Kramer, vice president of the Trenton Auto Radiator Works; Lester Dunn, The McIntire Connector Co.; A. Ulbert, Alco Valve Co.; and the host, T. W. Binder.

St. Louis Jobber Who Started In Refrigeration Parts Business In 1929 Traces Growth of Supply Business

ST. LOUIS—How the refrigeration and air-conditioning parts and supplies jobbing business has grown in the space of a comparatively few years is amply demonstrated in the progress made by the refrigeration and air-conditioning division of Brass & Copper Sales Co. here, which wholesales a complete line of refrigeration supplies.

The firm, which claims to be the first refrigeration supply house in St. Louis, is an agent and distributor for Revere Copper & Brass, Inc., and got its start in the refrigeration parts business back in 1929, when it sold special refrigeration tubing and flared fittings.

Now the company handles a complete line of refrigeration and air-conditioning supplies, representing the products of more than half-a-hundred manufacturers, and the division's business grew to such proportions that early in 1937 an addition was made to the company's headquarters, located centrally in St. Louis, to house the increased operations.

The firm's staff numbers 26 persons, exclusive of the truck drivers who handle the local deliveries. There are five outside men specializing in refrigeration, and a large inside counter force.

Officers of the company are H. P. Hubbell, president; J. B. Sharp, vice president; and Howard H. Hubbell, secretary-treasurer and manager of the refrigeration division in charge of purchases and sales. Leland W. Kuhn is the assistant treasurer and credit manager.

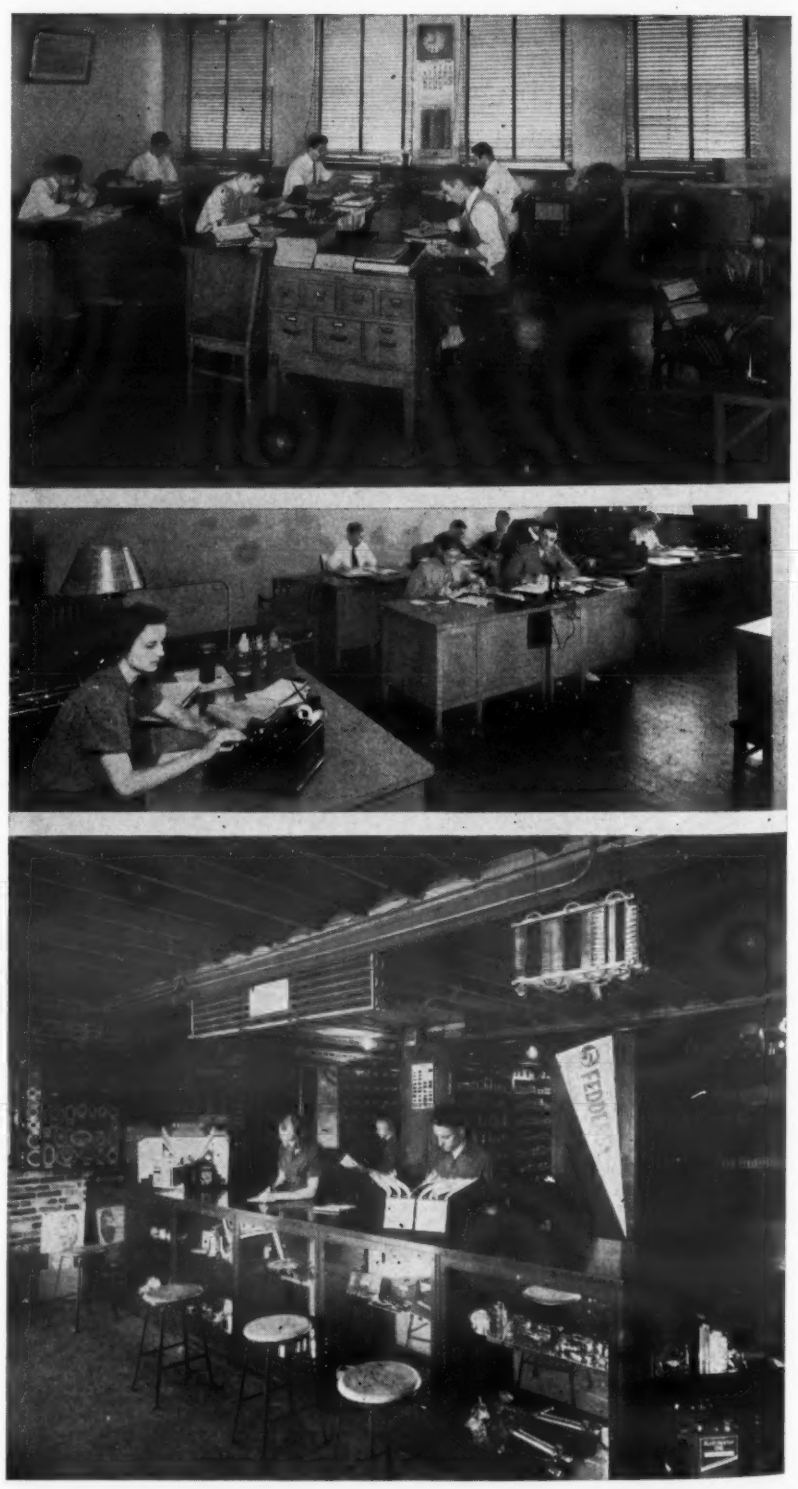
Outside salesmen are Manuel Brown, G. B. Leitch, Otto A. Friemel, Earl J. O'Brien, and W. J. Wind. Charles Wunderlich is in charge of the counter and Ed Braucourt bosses the "city desk."

Early this year the firm issued a 178-page catalog, and regularly covers by salesmen the southern half of Illinois, most of Missouri, and parts of northern Arkansas.

One of the outside salesmen, who has had engineering and drafting experience, gets in touch with consulting engineers working on refrigeration and air-conditioning jobs in the vicinity of St. Louis. When the job is worked up in their office, the Brass & Copper Sales Co. is in position to work up a complete bid on all the products which it has to offer to that job.

The complete staff is at work through the busiest season of the year, taking vacations earlier in the year when demands are not so heavy.

Modern Offices of Parts Jobber



In the pictures above is presented a graphic demonstration of the type of establishment maintained by the refrigeration and air-conditioning supplies jobber today, and the extent of the business operations that he carries on. The pictures are of the refrigeration division of Brass & Copper Sales Co., St. Louis supplier.

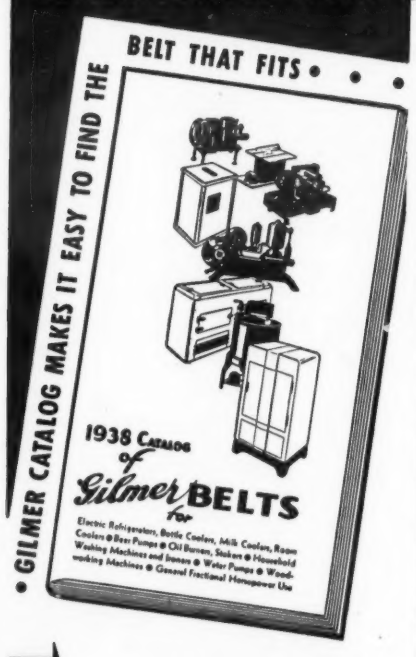
In the top picture are shown the salesmen who cover the "outside" territory for the jobber at their desks. The men nearest the camera are Manuel Brown and Bill Wind. In the next row are G. B. Leitch, Otto Friemel, and Earl O'Brien.

The middle picture shows the executive and accounting offices of the refrigeration supplies firm.

At the bottom is the "counter" of the refrigeration department, where service engineers and others purchase their supplies. Note the glass showcases, and the stools. Charles Wunderlich (left, behind the counter) is the "boss" of this part of the firm's operations.

NO GUESSWORK WITH Gilmer BELTS

CASH IN ON BETTER SERVICE WORK


BELT THAT FITS
GILMER CATALOG MAKES IT EASY TO FIND THE
1938 Catalog of Gilmer BELTS for
Electric Refrigerators, Bottle Coolers, Milk Coolers, Room Coolers • Beer Pumps • Oil Burners, Stokers • Household Washing Machines and Ironers • Water Pumps • Woodworking Machines • General Fractional Horsepower Use

Most complete belt catalog ever issued lists belts for 4450 models
Refrigerators
Air-Conditioners
Washing Machines
General f. h. p. Units
by
lengths, cross-sections, manufacturers' part numbers

• Stop guessing! Go to Gilmer! Now you can easily fit the drive *right*, even without knowing the belt's number or who makes it! The Gilmer Catalog—"America's Belt Bible"—tells all about Gilmer Belts, that are "tailor-made in the grooves," by belt engineers, on the world's largest assortment of V-moulds. Gilmer jobbers everywhere carry full stocks, insuring fast emergency service.

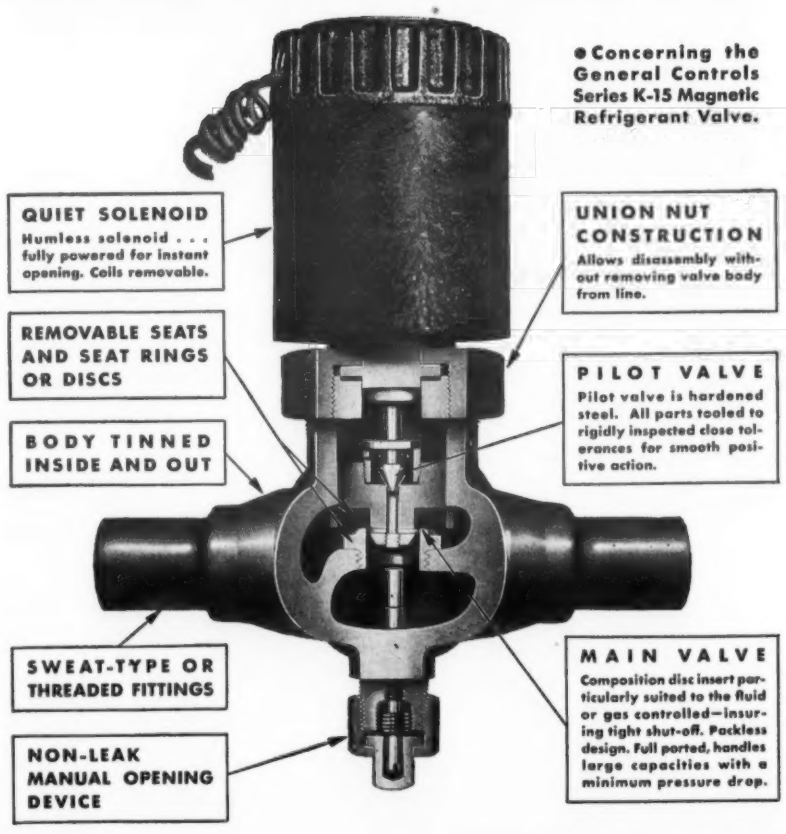
L. H. GILMER COMPANY
Tacony, Philadelphia

Tell us where to send your FREE Gilmer Belt Catalog.

Your Name_____

& Address_____

INSIDE FACTS


• Concerning the General Controls Series K-15 Magnetic Refrigerant Valve.
QUIET SOLENOID
Humless solenoid . . . fully powered for instant opening. Coils removable.
REMOVABLE SEATS AND SEAT RINGS OR DISCS
BODY TINNED INSIDE AND OUT
SWEAT-TYPE OR THREADED FITTINGS
NON-LEAK MANUAL OPENING DEVICE
UNION NUT CONSTRUCTION
Allows disassembly without removing valve body from line.
PILOT VALVE
Pilot valve is hardened steel. All parts tooled to rigidly inspected close tolerances for smooth positive action.
MAIN VALVE
Composition disc insert particularly suited to the fluid or gas controlled—insuring tight shut-off. Packless design. Full ported, handles large capacities with a minimum pressure drop.

SEND FOR 1938 CATALOG

GENERAL CONTROLS
1505 Broadway, Cleveland, Ohio
267 5th Ave., New York City, N.Y.
1370 Harrison St., San Francisco, Calif.
450 East Ohio St. . . Chicago, Ill.

Service

Description of Company's Service on 4-Page Stationery Is Good Promotion For Firm

KANSAS CITY, Mo.—Stationery on which his company's facilities and activities are completely described and illustrated is considered by Carl Donaldson, of Donaldson Radio & Electric Co., local radio and refrigeration service shop, to be the most effective means of advertising which he has used.

This illustrated story of the Donaldson organization covers the last three pages of the four-page stationery, while the first page is left blank for use in conveying the immediate sales message.

The printed matter on the last three pages shows various portions of the company's quarters, describes the equipment, and introduces the men whose pictures are shown.

Content of the first-page message depends, of course, upon the purpose for which the letter is sent out, and the person to whom it is sent. If it is sent to a prospect for refrigeration service, the refrigeration angle is emphasized, but if sent to a prospect for some other service, that department of the organization's business is stressed.

"Whenever we want to conduct a direct mail campaign on any of our services, we merely print up a batch of these stationery forms featuring that particular service," explains Mr. Donaldson.

"Each fall we send out about 8,000 letters on refrigeration service, and these letters bring in good results. We also make a refrigeration mailing in the spring which brings in lots of business. Every letter that we write is written on this kind of stationery, and this constant promotion gets a lot of people interested in our establishment.

"We tried a lot of advertising stunts before we adopted this letter idea," Mr. Donaldson declares, "but we find that this is the best."

Peerless Thermal Valve Has Mechanical Joints

CHICAGO — Recently introduced by Peerless of America, Inc. is the model V thermal expansion valve, a hermetic sealed unit constructed of spring-temper phosphor bronze, and designed by H. J. Matteson.

The valve has all mechanical joints, solder being used merely as a gas seal, without any reliance being placed upon it for mechanical strength. Cover is spun into the body, capillary tube is threaded into the cover, the bulb is rolled tight on the capillary with a 1/32-inch radius wheel, and is sealed after charging by pressing a steel ball into the end of the bulb to retain the charge while soldering.

Diaphragm of the valve, of spring-temper phosphor bronze, is so backed up by the valve body that it will stand great pressures without distortion or rupture, the company claims. In one test on the valve, it was placed in a 350° oven for one hour, after which it was tested and found to have its full thermal charge. Cut apart, the diaphragm was found in perfect condition, Mr. Matteson claims.

Body and cover of the unit are made from solid brass forgings, and other brass parts are made from solid brass rod. There are no cast parts in the valve. The valve incorporates a hard stainless steel ball and a soft stainless steel seat bushing, to get a tight-closing full-opening orifice.

Pressure is transmitted from the diaphragm pusher disc to the ball carrier by three brass pusher pins, which are said to insure proper centering of the ball in the orifice.

Stainless steel spring used in the valve has a build-up rate of 35 lbs. to the inch, it is said. Accurate adjustment of the unit is obtained through a combination of low rate of spring pressure build-up and a comparatively fine thread on the adjusting screw. One complete turn on the adjusting screw on a methyl chloride valve, it is claimed, results in approximately 1° superheat change.

Advantages claimed for the liquid-charged valve are that the body of the valve may be placed in an ambient temperature either higher or lower than the bulb temperature, with no danger of loss of control.

Metal Asbestos Gaskets Are Introduced

NEW BRUNSWICK, N. J.—Goetze Gasket & Packing Co., Inc. here has announced a new line of corrugated metal-asbestos gaskets, treated with a metallic compound to increase resistance to heat, pressure, moisture, and corrosion.

New coating also is said to prevent the asbestos from sticking to flanges, and to cut down damages from handling.

Fast Operation, Compact Size Claimed For New Imperial Testing Unit

CHICAGO—A new type of charging and testing unit, which is said to combine all the advantages of a double-gauge unit with the lightness, compactness, and ease of handling of a single-gauge unit, has been announced by Imperial Brass Mfg. Co. here.

Known as Imperial No. 500-C Hi-Lo charging and testing unit, the new unit is said to be entirely different in operation from the conventional single-gauge unit, and to do everything a double-gauge unit will do. Special features claimed for the unit include:

1. When connected to both sides of the system, it will give the pressure readings of both the high and low sides with a single gauge and a single valve.
2. It permits by-passing at any time without capping the charging and purging port.
3. It may be used separately on the high side or low side with maximum convenience.

Said to be exceptionally speedy and simple to use, the unit has a

New Testing Unit

WHEN UNIT IS CONNECTED TO BOTH SIDES OF THE SYSTEM, THIS GAUGE MAY BE USED AT WILL FOR READING HIGH AND LOW SIDE PRESSURES.
WHEN CONTROL IS POINTED STRAIGHT UP, REFRIGERANT IS FREE TO BY-PASS FROM HIGH TO LOW SIDE.
MASTER CONTROL HANDLE. POINTER ON THIS HANDLE INDICATES WHICH PORT IS OPEN AND SOURCE FROM WHICH GAUGE READING IS OBTAINED.
AUXILIARY NEEDLE VALVE CONTROLS CHARGING AND PURGING PORT.

single master control handle which operates a double-acting valve. When this control is turned so that its pointer is toward the high side connection, the high side port is opened and the pressure gauge shows the high side pressure. When it is turned toward the low side connection, the low side port is opened and the pressure gauge shows the low side pressure.

Only a half turn of the control is said to be required to close one port and open the other. If the control is pointed directly upward, both ports of the unit are opened, and the gas is free to by-pass from the high to the low side.

Valve body and control handle are made of brass forgings, and the stem is made of steel, and is of heavy-duty, double-seating type. Unit comes equipped with 30-in. to 150 lbs. compound gauge with temperature scale.

Peerless Floor And Ceiling Type Air Conditioning Units Make Sales

PEERLESS CEILING TYPE AIR CONDITIONING UNIT WITH HIGH DISPERSION HEAT TRANSFER SURFACE

1. MORE PROFITABLE
because these integral cabinet type units comprise a larger part of the equipment necessary to a complete air conditioning installation and eliminate much unprofitable assembly and construction work on the job.

2. AND MORE FREQUENT
because there are no similar units on the market equipped with Peerless High Dispersion Heat Transfer Surface, the new Peerless development that has established a new "high" in air conditioning coil efficiency.

PEERLESS of AMERICA, Inc.
Established in 1912 as the Peerless Ice Machine Co.
Main Factory—General Offices
515 West 35th Street
New York Factory 43-20 34th Street Long Island City
Chicago
Pacific Coast Factory 3000 S. Main Street Los Angeles
PEERLESS JOBBERS IN ALL PRINCIPAL CITIES
BUY PEERLESS FOR PERFORMANCE

MAKES Floating Ice

Beyond COMPARISON

PELCO gives the buyer twice as much—that's why it's beyond comparison as a profit-maker for you. Any place selling bottled beverages is a prospect for PELCO with its enormous hourly capacity. PELCO makes its own floating ice automatically as needed and gives in addition a roomy refrigerator compartment below . . . requires no more installation than plugging it into a light socket. PELCO makes profits for the user—operates on a few cents a day—that's why it's profitable for you to sell.

PELCO is a clean, sweet, manufacturing job that lets you make a profit and KEEP it. CASH IN on the Super-powered PELCO NOW—write for all the facts. Address Desk A-78.

PELCO Electric BEVERAGE & BEVERAGE-FOOD COOLERS

Refrigeration Division
PORTABLE ELEVATOR MFG. CO.
BLOOMINGTON, ILLINOIS
In Canada, UNIVERSAL COOLER CO. of CANADA, LTD. BRANTFORD, ONTARIO

RANCO
COMMERCIAL CONTROLS

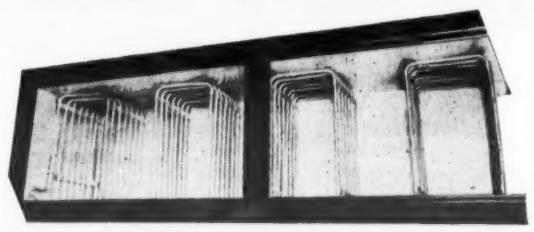
Convenience — capacity — dependability! These are the qualities that characterize Ranco heavy-duty commercial controls — for Beverage Coolers, Water Coolers, Milk Coolers, Ice Cream Cabinets, Display Cases and similar applications.

Ask Your Ranco Jobber

Ranco INC., Columbus, Ohio, U.S.A.

THE IDEAL SPEED COOLER

Tremendous Capacity
Unbelievable Fast Cooling Compartments



Can be used For Wet or Dry Storage

CONTROL THE BEVERAGE COOLER MARKET IN YOUR TERRITORY

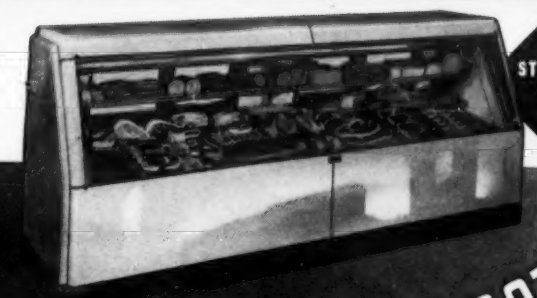
The beverage cooler your customers will invariably prefer.
It is a proven fact that in any territory where the Ideal Speed Cooler is in operation, all competition is eliminated.
WHY? Enormous capacity, unbelievable fast cooling, satisfying the most exacting demands.
Compartment coil feature eliminates "hunting" or "wading" for the right brand.
Sturdy in construction, beautiful in appearance. Two models, six sizes.
CASH IN on the beverage cooler sensation of the year. Some territories still available.

IDEAL BEER COOLER CO. 1500 No. Broadway, St. Louis, Mo.
Manufacturers of all kinds of Liquid Coolers

THE INDUSTRYS DOMINANT LINE

If Koch equipment is not already being sold in your territory, write TODAY for information about the Koch franchise. There is still room in the Koch organization for additional distributors.

WELDED STEEL



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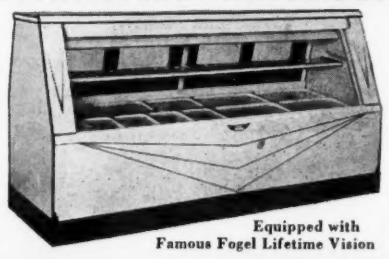

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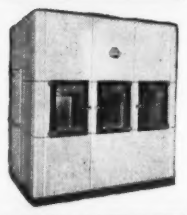

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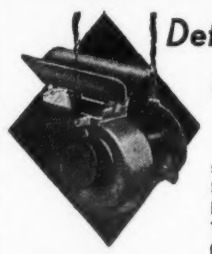

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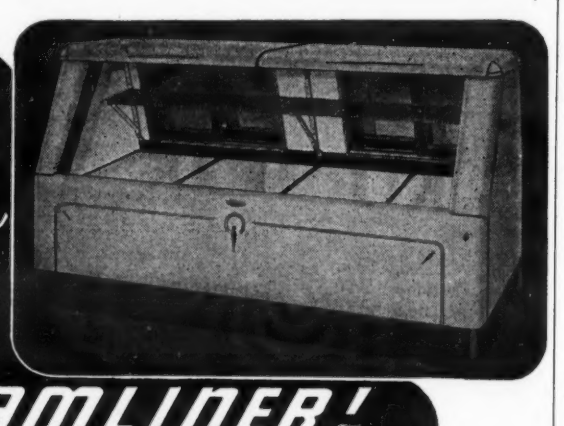

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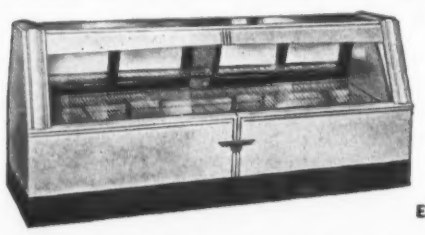

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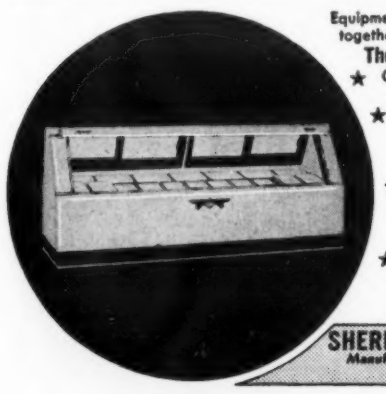

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Dutcher Describes Characteristics of Vitamins & Tells How Temperatures Affect Their Potency In Foods

STATE COLLEGE, Pa. — There are many conditions in the storage and handling of foodstuffs which will tend to reduce the vitamin content of the foods, and temperature is one of the most important of these conditions, it was explained by Prof. R. Adams Dutcher, head of the department of biological chemistry, Pennsylvania State College, before the Food Preservation Conference held here recently.

Prof. Dutcher described the nature, source, function in promoting health, and conditions that lessen the potency of each of the various vitamins which science has uncovered.

Food chemists, food engineers, and refrigeration engineers are becoming interested in ascertaining the vitamin content of fresh food and finding methods of preservation that will insure a reasonably high vitamin content in preserved foods sold on the market, Prof. Dutcher began.

Vitamin "A," he explained, has proved to be a fatty alcohol or sterol, soluble in fats, with the chemical formula $C_{20}H_{29}OH$. It has been synthesized, but the possibility of a synthetic commercial product is quite remote.

So far as animal sources are concerned it is found in highest concentration in fish liver oils, fish meals, and similar materials. Vitamin "A" does not exist as such in plant materials, being present as an orange yellow pigment called carotene.

LIGHT, OXYGEN HURT 'A'

Carotene and vitamin "A" are easily affected by light and oxygen, Prof. Dutcher said. Food materials subjected to light in the presence of air or pure oxygen decrease in vitamin "A" potency very rapidly. Vitamin "A" and carotene are relatively stable to heat in the absence of oxygen although some destruction occurs at high temperatures.

"Vegetable tissues must breathe during storage," declared Prof. Dutcher, "and, since these respiratory processes are oxidative in nature, it is but natural that we should expect to find vitamin destruction. Consequently, when vegetable tissues are stored at ordinary temperatures there is a pronounced tendency for vitamin potency to diminish.

COLD STORAGE HELPS IT

"Any treatment that will reduce bacterial action and cell respiration to a minimum will preserve carotene and vitamin 'A.' This is the principal reason why cold storage tends to preserve vitamins. Even at cold storage temperatures, however, some destruction continues if there is an opportunity for oxygen absorption.

"This is best shown by the storage of butter over long periods. Yellow summer butter when stored for long periods of time in cold storage will usually be less pigmented at the surface where oxygen absorption has taken place. Biological assays made on samples of the surface butter which has been bleached show that vitamin potency is very low.

"Yellow butter in the deeper layers is higher and compares favorably with that of the original butter at the time it went into storage."

PRESERVED BY FREEZING

Vitamin "A" seems to be well preserved in most frozen vegetables and fruits, and when ordinary canning processes are carefully controlled, eliminating opportunity for oxidation, canned vegetables and fruits can be produced which compare favorably in vitamin content with the fresh materials from which they were made, the speaker said.

Foodstuffs rich in fats should not be permitted to become rancid for the reason that rancidity tends to catalyze destructive changes so far as vitamin "A" is concerned.

When vitamin "A" is omitted from the diet a number of pathological changes occur. One of the main functions of vitamin "A" is to stimulate normal growth of those cells which compose the epithelial linings of the body. When these linings become impaired due to low vitamin "A" intake there is greater opportunity for bacterial infection.

This is particularly true of the linings of the respiratory tract and that is why it is sometimes said that vitamin "A" tends to build up resistance to respiratory infections. Vitamin "A" promotes growth, normal reproduction, lactation, and normal vision.

The visual purple of the eye depends upon vitamin "A" or carotene for its synthesis. Without visual purple we are unable to see normally. Clinical researches indicate that night blindness and light sensitivity are due at least in part to vitamin "A" deficiency. It would appear that the daily human requirement for vitamin "A" ranges from 3,000 to 6,000 International Units.

Fish liver oils such as halibut liver oil and cod liver oil are the best animal sources so far as vitamin "A" is concerned. Visceral fats are usually good sources also, if animals have been well fed.

The best plant sources are those which are rich in the orange yellow pigment carotene. Consequently, yellow carrots, sweet potatoes, and similar foods are good sources of vitamin "A." Most all green leafy plants are excellent sources of carotene. Dried apricots and dried peaches happen to be especially good sources of this vitamin.

Vitamin "B_1" is a water soluble vitamin often referred to as the antineuritic vitamin because it tends to act as a nerve stimulant. When this vitamin is omitted from the diet the characteristic disease produced is beriberi.

This vitamin has been isolated in crystalline form and was synthesized by an American investigator, R. R. Williams, in 1936. This vitamin is now known as Thiamin and is sold on the market in the form of the chloride or bromide.

WHAT 'B' DOES

This vitamin promotes appetite and digestion, stimulates growth, and speeds up the metabolic processes. It forms a part of a necessary oxidative enzyme system of the body and seems to be necessary for normal nerve function, reproduction, and lactation. The daily human requirement is about 200 to 400 International Units.

Vitamin "B_1" is quite generally distributed in fruits and vegetables, while whole grains and yeast are particularly good sources of this vitamin. Milk is a fair source and most animal tissues contain appreciable amounts.

HIGH TEMPERATURES HURT

Vitamin "B_1" is very stable in acid solutions, is completely destroyed in alkaline solutions, and under ordinary conditions can be heated to 100° C. without much loss. At higher temperatures it is destroyed very rapidly. There is no evidence that it can be destroyed by freezing. This vitamin is gradually destroyed during ordinary storage, but can be preserved quite efficiently at cold storage temperatures, the speaker said.

When the antineuritic properties of foods were first recognized, the antineuritic factor was referred to as vitamin "B." It was not long, however, until it was discovered that the so-called vitamin "B" was really a complex consisting of many factors. When Thiamin was finally isolated and identified as the antineuritic factor, its name was changed to vitamin "B_1."

A second factor has been isolated recently in the form of yellow fluorescent crystals. Its chemical structure has been determined and a number of derivatives have been synthesized. The new substance is called riboflavin which has the chemical formula $C_{17}H_{20}N_4O_6$. This is a water and alcohol soluble compound which has been isolated in largest quantities from milk, eggs, and liver.

Riboflavin seems to be quite well distributed in foods and can be obtained in fair quantity from meat, especially kidney and liver.

This vitamin seems to be necessary for the proper functioning of the gastro intestinal tract, for maintenance of healthy skin and for normal visual functions and body growth.

'C' PREVENTS SCURVY

Vitamin "C" is sometimes referred to as the antiscorbutic or scurvy-curing vitamin, since it is specific in the prevention and cure of scurvy. It has been isolated in crystalline form, its structure has been determined, and it is now being synthesized artificially in quantity for the clinical market.

It is known chemically as ascorbic acid or cevitamic acid and has the formula $C_6H_8O_6$. It is a water soluble compound, very easily oxidized and reduced and, consequently, is very easily destroyed.

This vitamin is essential for the manufacture of intercellular cementing substance in the body tissues, for normal dental and bone development, for strength and elasticity of blood vessel walls, and for the prevention of scurvy. The daily human requirement is from 300 to 450 International Units.

It occurs in relatively large amounts in the citrus fruits, tomatoes, and in most fruits and vegetables. Green leafy plants are invariably good sources of this vitamin. Cow's milk, which cannot be considered a rich source, contains from 15 to 25 milligrams of ascorbic acid

(*Concluded on Page 17, Column 1*)

What Has Refrigeration To Do With Vitamins?

What has refrigeration to do with vitamins? Of what consequence is the rate of evaporation from a free water surface to food preservation? What is it that the dealer in food store or household refrigeration equipment can learn from packing plant refrigeration methods?

The answer to the interrogative statements above will be found in the rather lengthy articles (reports of talks at the recent Food Preservation Conference in State College, Pa.) published on this and the following pages.

Those who are interested in doing a better job, of broadening their scope in refrigeration applications, and in digging out a more scientific basis for their arguments on behalf of mechanical refrigeration will read these articles with great profit. And the information will be valuable to anyone connected with the industry—from a salesman of household electric refrigerators to an executive of a firm manufacturing machines of 50-tons capacity.

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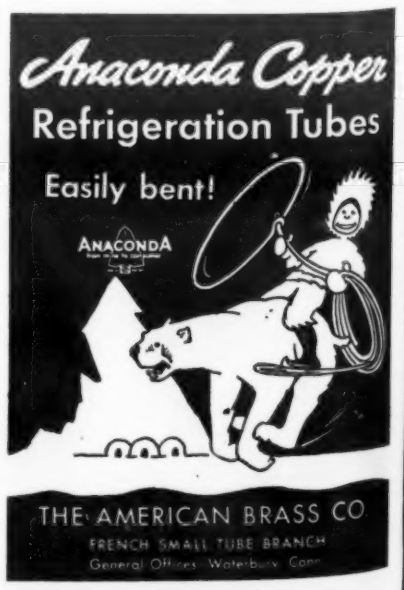


Proper Temperatures Needed If Foods Are To Preserve Vitamins

(Concluded from Page 16, Column 5)

per quart of milk. Liver and adrenal glands contain relatively high concentrations of ascorbic acid.

This vitamin is probably the most unstable of all the known vitamins. In the reduced form it is physiologically active but is easily destroyed by oxidation. When partially oxidized it is still physiologically active but cannot be titrated by the chemical methods referred to above. It is, therefore, necessary to reduce the partially oxidized form back to the reduced form before using the chemical titration method.

VITAMIN 'C' PRESERVED

Vitamin "C" is lost rapidly during drying processes unless the drying is done almost instantaneously. Slow drying with opportunity for oxygen absorption is highly destructive. If oxygen can be kept away, the vitamin is relatively stable to heat.

It is therefore possible to can and preserve fruits, fruit juices, and vegetables with little or no vitamin "C" destruction. In fact, canned goods are now on the market which are actually superior in vitamin "C" content to so-called fresh fruits and vegetables which have been stored for long periods.

While there is less vitamin "C" destruction at cold temperatures, some destruction occurs as long as there is any respiratory activity. All evidence points to the fact that freezing preserves ascorbic acid for long periods and frozen materials which have been freed of oxygen seem to contain about as much vitamin "C" as the original fresh material.

SUBSTANCE IN VITAMIN 'D'

Not so long ago vitamin "D" was regarded as a single substance, Prof. Dutcher pointed out. Today all evidence points to the fact that several different chemical forms exist. Two general types are recognized, namely, the natural and the artificial vitamin "D." The natural form exists in fish liver oils, milk, eggs, etc.

The so-called artificial commercial type is made by irradiating a plant alcohol known as ergosterol with ultra-violet light. This forms an active product which has been purified in crystalline form and is called calciferol ($C_{27}H_{42}O$). The artificial form is sold on the American market as viosterol.

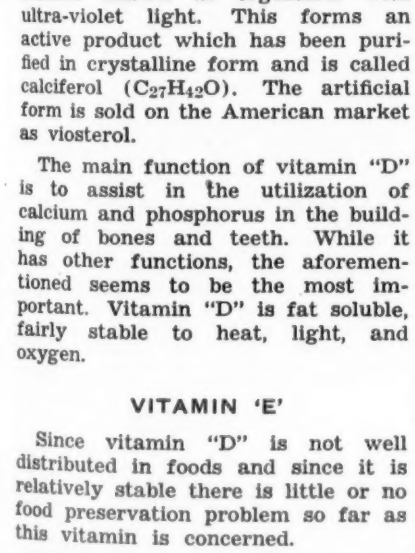
The main function of vitamin "D" is to assist in the utilization of calcium and phosphorus in the building of bones and teeth. While it has other functions, the aforementioned seems to be the most important. Vitamin "D" is fat soluble, fairly stable to heat, light, and oxygen.

VITAMIN 'E'

Since vitamin "D" is not well distributed in foods and since it is relatively stable there is little or no food preservation problem so far as this vitamin is concerned.

Vitamin "E" is sometimes known as the fertility or antisterility vitamin. It is usually prepared from wheat germ oil, is fat soluble and is, in all probability, an alcohol. While there seems to be increasing evidence that this vitamin may have clinical value, data are too few to merit further discussion at this point.

"All evidence points to the fact that vitamin 'E' is quite universally distributed and so far as your speaker is aware no preservation problem has as yet presented itself," Prof. Dutcher concluded. "Vitamin 'E' is quite stable to heat and rather easily preserved at ordinary temperatures."



Value of Mechanical Refrigeration To Meat Industry Explained By Tale Of What Would Happen Without It

STATE COLLEGE, Pa.—A graphic presentation of what mechanical refrigeration means to the meat packer, the meat retailer, and the consumer was made by Henry D. Tefft, representing the Institute of American Meat Packers, before the Food Preservation Conference held here the latter part of June.

Mr. Tefft made his point by giving an outline of what would happen **if mechanical refrigeration should suddenly become non-existent, depicting the resulting conditions as follows:**

"John Brown, a mythical farmer, say in Minnesota, finds one day in May that he needs some cash and decides to take his hogs to market. They are ready for market and are about the only thing on the farm that he can turn into cash immediately.

REFUSE TO BUY HOGS

"Now imagine John Brown's surprise if the packer should refuse to take his hogs and should say, 'Our mechanical refrigeration is out. We have to rely on ice now. Last winter was mild and the ice crop was small. We are running short of ice and need all of it for the coolers where our meats are in cure.'

"So the farmer takes back his hogs, wondering where he is going to get cash to meet his immediate expenses. You can judge for yourself whether a farmer under such conditions would continue to be a consistent raiser of hogs.

"About that same time Mrs. Smith goes to her meat market to purchase some supplies. She asks for sliced bacon. The butcher shakes his head sadly.

" 'We are not getting any more sliced bacon these days, Madam. You know none of the packers have any mechanical refrigeration now. The packers can't chill the bacon hard enough to slice it satisfactorily and besides it wouldn't be very good anyway, because the packers have to use so much salt to keep the bacon from spoiling that you wouldn't like it. We are not receiving any more mild cured meat.'

"That reminds Mrs. Smith of something and so she says to her butcher, 'That last steak we had was tough and it tasted peculiar near the edges of the slice. Why was that?'

BEEF CAN'T BE AGED

" 'Well, you know,' replies the butcher, 'the packers have to rush their beef through the coolers so fast these days the beef doesn't age a bit and even at that they can't prevent the meat from getting sticky because the ice refrigeration doesn't maintain even temperatures in the cooler. It's too bad but I don't know what we are going to do about it. We will soon be back to the days when we had to eat beef almost the same day it was slaughtered.'

"It seems reasonable to suppose that Mrs. Smith will no longer build her meals around meat to the same extent as she has been accustomed to doing in the past. Lack of adequate refrigeration would soon produce a condition of uncertain demand coupled with uncertain supply. The industry could not long survive such a situation.

"Probably this same condition would exist in all other perishable food industries and our tables would be dependent upon 'in season' staples of doubtful and uncertain quality.

PACKING HOUSES IN SOUTH

"Due to mechanical refrigeration, the packers have been able to build packing houses in the south and the farmers have begun to raise live stock.

"John Jones, a farmer in Tennessee, had some steers which he had been developing carefully for market. When they were well finished, he put them on his truck and took them into the local packing plant. Imagine his surprise too, when the packer refused to buy them.

" 'You know we can't handle these any more. We used to chill them carefully in coolers with closely controlled temperatures and humidities and ship them east. Even if we were able to obtain ice we wouldn't be able to do a good job. The beef coolers would be too damp and moldy. I guess you farmers will either have to peddle your beef yourself locally or ship the cattle north to points where they have natural ice.'

"Perhaps the illustrations I have given may seem a little fantastic but they are no more fantastic than to conceive of operating a packing plant these days without adequate refrigeration."

Mr. Tefft then went on to outline in detail some of the functions of modern mechanical refrigeration systems in the packing plant.

EVEN PRODUCTION & SALES

One of the important functions of the meat packer, he said, is to carry over into periods of scarcity some of the surplus meats that accumulate during heavy runs. In the case of swine, the normally heavy run of December, January, and February will be drawn upon in part to supply July, August, and September demands for cured meats. About one-half of the dressed carcass, however, is diverted immediately to fresh pork cuts and the manufacture of lard.

The packer must be prepared, therefore, to correlate supply with demand. Refrigeration is the tool that he uses to accomplish this. He can place the product temporarily in a freezer with practically no depreciation in quality or he can place the product in cure and retard the development of the cure by lowering temperatures.

NEED FOR FREEZER SPACE

There are other reasons also why he needs freezer space. Demand may be strong for certain fresh meat cuts such as loins and slow for other cured cuts such as hams. So he may buy hogs for the fresh cuts and store the cuts which are to be cured.

Freezer space enables the packer to store the boneless beef if the sausage demand is slow. This insures a market for the farmer any time he wishes to sell any type of live stock he has and helps to keep him raising live stock consistently.

Nowhere, said Mr. Tefft, does refrigeration function more importantly than in providing ways and means of furnishing Mrs. Consumer with just what she wants just how she wants it. It protects the product from deterioration whether sold fresh or cured; it controls the development of the proper flavor; it preserves the attractive appearance of the product.

QUALITY DEMANDED

Hams must be mild in flavor and tender. No longer can they be heavily salted to keep them from deteriorating. Scientific application of refrigeration minimizes the hazards from deterioration.

Frankfurters must be firm, bright in color, smooth and unwrinkled, and free from mold. Air-conditioned refrigerated storage space accomplishes this.

Mrs. Consumer's steaks must be bright in color and tender. Air-conditioned refrigerated aging rooms are the answer.

She wants her bacon sliced thin and uniform and in 1-lb. packages. Cold temperatures for chilling the bacon slabs for slicing and air-conditioned bacon slicing rooms provide the necessary conditions.

The first and most important step in the curing of a ham, Mr. Tefft pointed out, is the chilling after slaughter of the carcass from which the ham is obtained. Chilling the ham too low, however, will hamper later operations. A final inside ham temperature of 36° F. is desirable.

Refrigeration equipment must be installed which will quickly and uniformly chill a hog carcass to this temperature. This is not entirely easy because a hog carcass varies in thickness and the thinner portions chill much more rapidly than the thicker portions. Hog carcasses are chilled on a definite temperature schedule. Recording thermometers are used for checking the temperature of the chilling rooms.

Lower temperatures are one means of retarding the breakdown of animal tissue. Another agency is the replacement of some of the meat juices with salt brine. The operation which accomplishes this is called curing.

Curing would be a relatively simple operation if there were no limits to the replacement of meat juices with salt brine. Unfortunately, however, the consumer has acquired a taste for a ham with relatively low salt content and a distinctive cured flavor. This flavor develops best at temperatures approximately 38° F.

CURING ROOMS

The packer, therefore, closely controls the temperature of his curing rooms. This means close control in all portions of the curing room, at the ceiling as well as at the floor level. Certain phases of the curing process will proceed more rapidly at higher temperatures than at lower temperatures. The packer must, therefore, control the curing temperature closely not only to develop the proper flavor but also to obtain uniform results and to gauge with reasonable accuracy when to terminate the curing process.

Various packing house products, Mr. Tefft pointed out, are stored at different temperatures. For example, smoked products hold their color better at temperatures of 55° F. whereas fresh pork retains its bloom best at near freezing temperatures. Any variation from the temperatures at which products leave the packing plant during shipment is detrimental.

The trend to packaging and wrapping packing house products has added to the packer's problems. If smoked sausage were packed in cartons as it comes hot from the smokehouse, moisture would be deposited upon the sausage after it had chilled to storage temperature because the hot air adjacent to the sausage would be chilled below its dewpoint.

This moisture would remain upon the sausage because of the lack of air movement in the carton and the sausage might become moldy. For this reason all sausage or similar products are cooled to storage temperature before being packed.

AGING PROCESS

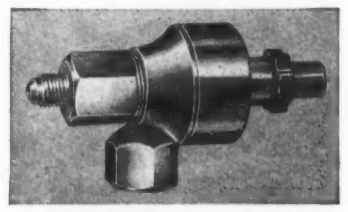
It is a well known fact that beef can be aged without deterioration if held at the proper temperatures. Up until quite recently, the aging was accompanied by a growth of mold or "whiskers." In order to remove this mold, it was necessary also to remove a considerable percentage of surface meat. This, of course, represented a direct loss.

In recent years aging rooms have been designed which have very closely controlled temperatures and humidities. The development of mold is nominal when these rooms are used and the trimming losses are very small.

THE BUYER'S GUIDE

AMINCO EXPANSION VALVES

Automatic — Thermostatic



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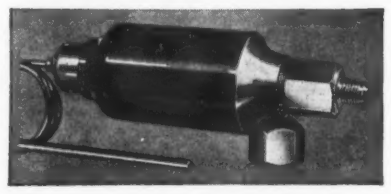

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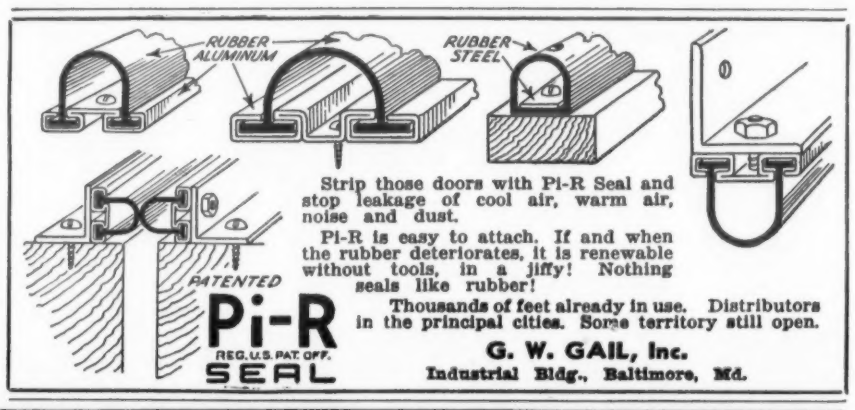

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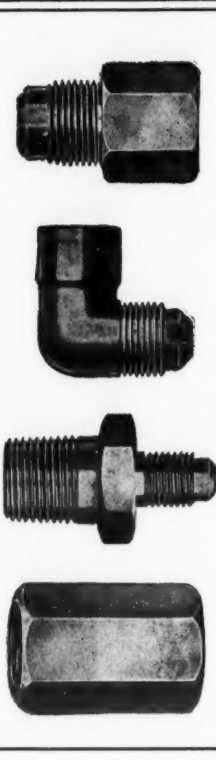

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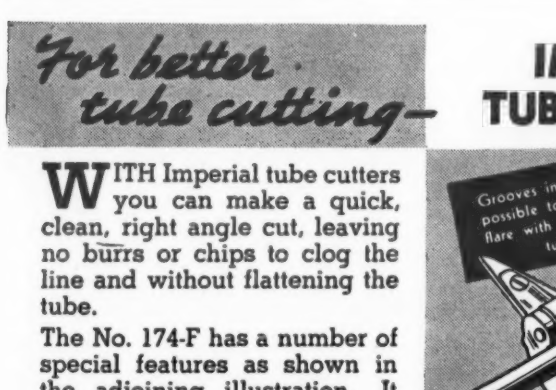

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Lewis Gives Fundamental Data Which Indicates Importance of Humidity In Food Preservation

STATE COLLEGE, Pa.—"Final objective in food preservation is to control (a) physical condition of the product by the degree of moisture content, which is a function of humidity and air motion and (b) its chemical state, which is principally a function of temperature, but influenced by humidity and air purity," declared Logan Lewis, chief engineer of Carrier Corp., in advocating that "food preservation" be treated as a year-around air-conditioning problem, in his address before the Food Preservation Conference, sponsored by the American Society of Refrigerating Engineers the week of its meeting here.

Mr. Lewis presented much new data pertaining to the problem of humidity control in food storage work, and offered a number of rather revolutionary suggestions for the design and application of equipment for such work.

"With very few exceptions all of those concerned with the food industry seemingly have not heretofore accepted the control of the atmospheric conditions which affect the product as an air-conditioning problem, whereas the essential is complete or year-around winter and summer air conditioning," Mr. Lewis declared. "Rather have they thought of food preservation as the control of temperature.

HUMIDITY IGNORED

"More recently humidity has been given consideration, but except for a few installations consideration of it has been limited to the selection and design of equipment for applying refrigeration."

This judgment is based upon the number and character of the systems that have recently been installed, Mr. Lewis explained.

"For the nature of these, the buyer must accept some responsibility, the technician most of it," he said.

"Please accept the foregoing as a deliberate, somewhat dramatic, and I hope excusable attempt to emphasize a point that needs all the emphasis that can be placed upon it.

"A given relative and a given absolute humidity can be had at only one dry-bulb temperature—thus, we identify two important factors the simultaneous control of which are of vital importance to food preservation," said the speaker.

"Since these two cannot be maintained at optimum points without proper air distribution, the third factor of air motion immediately becomes a vital and concurrent essential.

"The fourth—air purity—just falls in with the others."

WHAT IS OBJECTIVE?

Control of these factors, Mr. Lewis explained, is merely a means to an end. The ultimate and final objective is to control (a) the physical condition of the product by the degree of moisture content, which is a function of humidity and air motion, and (b) its chemical state, which is principally a function of temperature but influenced by humidity and air purity.

In approaching the subject, Mr. Lewis pointed to the fact that no product that contains water and is non-hygroscopic can be exposed to an atmosphere of less than 100% relative humidity without losing some of its moisture content. This is likewise true under certain conditions even when the air is supersaturated.

DRYING OF FOODSTUFFS

Thus, drying cannot be wholly avoided and fortunately it should not be since, for most fresh products, unavoidable chemical changes within cause moisture to come to the surface. This moisture must be removed, but at a rate equal to the normal flow rate from the interior, the speaker explained.

To air-conditioning people, drying means not only the removal of moisture from a product, but also the control or fixation of its final moisture content. Practical examples of these two circumstances are illustrated by one branch of the food industries, namely, dressed beef in storage and meats while being smoked and stored.

For the former, temperature and relative humidity must be kept closely to the optimum and the relative humidity related to the effective air motion so that the surface can be maintained at the proper degree of dryness.

In the latter, the process of smoking involves a closely regulated drying phase and afterwards the storage of these goods must provide for a definite final and maintained moisture content.

INDUSTRIAL DRYING

"From this premise industrial drying and food preservation involve many of the same problems and follow the same laws," said Mr. Lewis.

"Hence, to approach food preservation by means of air conditioning as a drying problem and in the light of experience in industrial drying, would seem to afford a novel and interesting approach.

GOVERNING LAWS

"The laws which apply to the rate of evaporation from a **free water surface** are well known. I quote from the second edition of 'Fan Engineering' which was edited under the direction of Willis H. Carrier:—

" 'Water, like any other liquid, tends to saturate the surrounding space with its vapor. At saturation the amount of vapor present and the pressure of the vapor tension, will be determined solely by its temperature. This will be true whether evaporation takes place in a vacuum or in ordinary air.

" 'In a vacuum, the pressure existing will be the true vapor pressure for the existing temperature, while in air the pressure, termed barometric pressure, will be the sum of the vapor pressure of the liquid and the pressure due to the dry air. This is in accordance with Dalton's law of partial pressures.

AMOUNT NOT AFFECTED

" 'It will be seen that while the air is spoken of as 'absorbing' or holding moisture, it actually does not affect the amount of vapor present.

" 'Atmospheric air ordinarily contains water vapor in varying amounts. This vapor will, in reality, be superheated for all conditions except saturation. It will be noted that the vapor pressure for any degree of saturation will be the same as for that air at its dewpoint and it may be shown that for air with a given dry-bulb temperature the ratio of the vapor pressure at dewpoint to that at saturation is a measure of the relative humidity of the air.

RATE OF EVAPORATION

" 'The rate of evaporation from a free water surface is controlled by three factors:

" '(1) The vapor tension of the water corresponding to its temperature.

" '(2) The vapor tension of the moisture in the air corresponding to its absolute moisture content or dewpoint temperature.

" '(3) The effective velocity of air over the surface.

PROPORTIONAL TO WET BULB

" 'In an unheated water surface the vapor tension of the water will be controlled by its temperature which assumes that of the wet-bulb temperature of the air about it. The difference in vapor tensions corresponding to the dewpoint and wet-bulb temperatures of the air will thus determine the rate of evaporation for a given air velocity.

" 'However, this difference is practically proportional to the difference in wet and dry-bulb temperatures of the air, or wet-bulb depression; thus, the rate of evaporation is proportional to the wet-bulb depression of the air in contact with the surface.

" 'The rate of evaporation with parallel airflow may be determined from

$$G = \frac{95 + 0.425V}{r}(e_w - e_a)$$

" 'Or with transverse airflow from

$$G = \frac{201 + 0.88V}{r}(e_w - e_a)$$

where

G = pounds of water evaporated per square foot per hour.

V = longitudinal velocity of the air in feet per minute.

e_w = vapor pressure in inches of mercury corresponding to the water temperature.

e_a = vapor pressure of the moisture in the air.

r = latent heat of evaporation.

" 'It will be seen from the above equations that the effective velocity of the air will vary with the nature of the flow.' "

Because those surfaces which are amply covered with free water are so irregular in shape, the basic formula cannot be applied without correcting experience factors, Mr. Lewis explained.

"Basic data on the optimum rate of moisture removal from all but two or three of the vast variety of perishable products is lacking," he continued. "Such data that may exist cannot be found in the literature of the day and its lack is the real handicap of the technician whose responsibility it is to design for those most vitally concerned.

"An identification and discussion of these factors, therefore, is in order.

"Since the vapor tension of water is a function of its temperature we are, in food preservation, normally concerned with the surface temperature of the product. This temperature is, of course, materially modified depending on whether the product is or is not superheated with respect to room temperature or more accurately with respect to room wet bulb.

"Drying is fundamentally a problem of heat transfer. In cases like the chilling of meats or the precooling of fruits or vegetables, the products are highly superheated. A great vapor pressure differential exists by virtue of the low room dewpoint as compared to the high surface temperature of the product and causes a flashing off of a considerable amount of moisture.

"It should be noted that this vapor pressure differential diminishes as

(Concluded on Page 19, Column 1)

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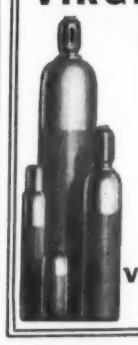

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Positive Means of Adding To Sensible & Latent Loads Advocated By Lewis

(*Concluded from Page 18, Column 5*)

the superheat is removed from the product as room temperature likewise falls as the superheat is removed from the product.

"Nothing can be done about it but to limit it to a practical minimum or to remove the superheat with chilled water when the product will not be damaged by water. This flash off will take place in a super-saturated atmosphere or fog because the differential which causes it is that between the pressure corresponding to the surface temperature of product and the temperature of the air.

MATTER OF 'SHRINKAGE'

"The upshot of this is that in air cooling superheated products a certain amount of 'shrinkage' is unavoidable. Good practice calls for the apparently profligate use of refrigeration by selecting equipment of great overload capacity.

"In so doing two desirable advantages are gained: (a) fast removal of the sensible heat and (b) rapid reduction of the vapor pressure differential. The overall result is reduction in shrinkage and the saving of time.

"During the precooling or chilling stages, other factors apply but superheat is the predominant one. In rooms in which the product is merely held or stored, superheat is obviously not a factor, but other factors over which superheat predominates in the chilling stage come into control. They are "wetness" of the surface, the wet-bulb temperature of the air and the velocity of air impinging upon the surface.

"Very few, if any, products present a 'free water surface.' If they did, surface temperatures would reach a state of equilibrium at the wet-bulb temperature of the air and evaporation would proceed as a function of the vapor pressure differential between air wet bulb and air dewpoint.

"In practice, the surface will normally be only partially wetted and therefore its temperature will reach equilibrium at some point between air dry bulb and air wet bulb—finally reaching air dry bulb when completely dry.

"Thus, an increasing vapor pressure differential tends to increase the rate of evaporation from the product as the amount of water on the surface diminishes. Each different product will have its own characteristics.

FOODS ARE HYGROSCOPIC

"Most food products are hygroscopic, meaning that when exposed to certain conditions of temperature and humidity they are such that they will absorb moisture from the air. This is a surface tension phenomena and comes into play as an opposing factor, as the moisture content of the product is reduced or as the relative humidity of the air is increased. In the case of cut meat surfaces, for example, evaporation ceases at units of from 94-96% if there is any superheat in the product.

"In drying, one objective is that of bringing the water to the surface for removal. This is best accomplished by first superheating (i.e. with respect to the conditions of the actual drying cycle) the material by subjecting it to a condition of high temperature and high relative humidity. If the material will stand the water pre-heating, time can be saved by actually condensing moisture on its surface.

'CASE HARDENING'

"One of the principal hazards of drying is 'case hardening.' What that amounts to is sealing the surface film so that it retards the flow of water from the interior. To whatever extent it may be done without hurting the appearance of a product —for example, without destroying the 'bloom' of meat—it can sometimes be put to good use in reducing 'shrinkage.'

"To turn back to the original thought, vegetables may hold a very considerable surface water content but most of it will be found trapped in interstices and hence presenting a relatively small surface for evaporation. Any water that is spread over the whole surface quickly evaporates so that its protection is soon lost.

"The flow of moisture from the interior to the surface is slow due to the cellular structure. It is therefore essential to reduce surface drying to the minimum with high humidity and by complete pre-cooling if wilting is to be prevented.

SEEK PRACTICAL MINIMUM

"It is obvious that it cannot be completely eliminated in holding except by storage in a saturated atmosphere of suitable temperature. While that is not impossible, it is rather difficult to get. The practical solution is therefore one of seeking a practical obtainable minimum.

"This vapor tension is a function of the dewpoint temperature of the air. The dewpoint temperature of room air results from the volume of air that is conditioned, from the dewpoint to which this volume is conditioned and the amount of water which evaporates from the product.

"Fortunately, this is an aiding rather than an opposing factor but not to the extent of making effective control of room conditions unnecessary for optimum results. The variance in the product and the variance of other factors is too great for self regulation to be wholly satisfactory. Also, it is obvious from the foregoing that this by-product of unavoidable 'shrinkage' moisture is evaporated from the product at widely varying rates.

"This by-product moisture normally accounts for a large portion of the latent heat load which must be carried by the conditioning equipment. More or less may either be added or actually subtracted from it by the infiltration of outside air through doors, elevator shafts, etc., depending upon the relation of outside dewpoint to room dewpoint. Thus, the latent heat load is determined by two major and one or two minor variables which are in no manner related each to the others."

The sensible heat load which must be carried by the same apparatus is a horse of another color, Mr. Lewis pointed out. Its several sources vary independently of the sources of latent heat load.

"In many applications both the latent and the sensible loads may, entirely independently of each other, actually change from positive to negative. As the proportion of one to the other changes sufficiently, or one or the other changes from positive to negative, conventional equipment becomes impotent and wholly incapable of controlling one or the other of the two vital factors of temperature and humidity.

"For example, if there is no sensible heat load, humidity runs amuck or else excessive cooling must be accepted or vice versa. When either happens, all control of the physical properties of the product is lost.

EXAMPLE WITH MEAT

"Consider a typical wholesaler of beef. The product is normally received from the western packers once in every 10 days or two weeks. When the room is fully stocked, the latent heat load is high. As daily sales diminish the amount of product in storage, the latent load is decreased and, since the sensible heat load may remain constant, results in a constantly increasing latent to sensible ratio.

"The only practical solution is to provide some means of supplying the latent heat load as the capacity of the product to supply it diminishes.

"The greatest fault of the conventional system is that it does not provide positive means of adding both sensible and latent heat to the room load as either or both of them may be required. This is the difference between the air conditioning concept and the concept as pictured by conventional practice.

NECESSITY OF REHEAT

"Without these means of reheat and rehumidification, it is absolutely impossible to maintain a control of both temperature and humidity with any type of equipment that is designed only for the removal of sensible and latent heat.

"A considerable wrench may be required to bring some minds to the acceptance of the idea of applying heat to a refrigerated space even for the purpose of accurately controlling conditions within that space. But it has been done in a few instances when far sighted people realized that with only a nominal increase in first cost and in operating cost uniformity could be assured regardless of season or weather or departure from the normal flow of product.

"Since the rate of evaporation increases in a direct relationship with increased effective air velocity the optimum for air motion is the minimum with which a satisfactory capacity for heat absorption may be had with a satisfactory uniformity of temperature level. In drying, the requirements of the equipment are constantly to convey heat to the material which is being dried.

SUMMER REQUIREMENTS

"In food preservation, there must be absorbed, in summer, the heat which is transmitted through the walls, floor, and ceiling of the room, which infiltrates through doors or other openings and which, in the case of superheat, is given off by the product.

"In winter the requirement may be either that of absorbing heat or of adding heat. The requirement is the arithmetical summation of sources of heat gain such as the superheat of products or the heat from lights and the occupants of the room.

"This is, in effect, the repetition of a point previously made, but space may well be taken for the sake of emphasis. It should be noted that the product with respect to storage room conditions will in normal flow always bear the same relationship.

"Exactly the opposite is true of the heat of transmission and infiltration. Thus the gain or loss of heat through external walls may have a very material effect upon uniformity of temperature which will vary from season to season.

"A factor of considerable importance is the effect of solar radiation upon one or more of the external exposures of the room. If this external wall is of heavy construction, such as 12-inch brick, for example, the lag and the penetration of solar heat may retard the peak of flow into the room until well after sundown.

"If the wall is of relatively light construction the lag may produce a condition in which the flow of heat through adjacent walls is positive in one case and negative in the other.

"If insulation is inadequate, a factor of greater importance may be the radiation of heat from the interior surface of one of these walls to a product that is placed too close to the wall. There is something to be said for avoiding the use of exterior walls wherever it is feasible and much to be said for leaving ample space for air circulation between an exterior wall and the product.

"When heat is being absorbed from the product with a uni-directional flow of air through it, the volume of air must be sufficient to absorb the heat without an excessive rise in temperature. In other words, if the condition of the air at the point of entry is held to the minimum which is permissible the rise in passing through the product must not carry the air above the maximum limits.

"The volume of air flowing through the space between the product and a wall or floor must be sufficient to take care of the heat loss or gain for which that part of the structure is a source without exceeding tolerable limits.

"Under this condition there will be some shrinkage and hence the absolute humidity or dewpoint of the air will likewise rise, the degree depending upon average surface moisture. When superheat is not being removed from the product, the wet-bulb temperature will remain constant while the dry bulb falls and the dewpoint rises.

"The foregoing is, of course, modified in one direction or the other depending upon the direction and magnitude of the flow of heat through the walls of the room.

"The variety of food products is so great as to preclude any attempt to set up limiting conditions. The optimum air movement is necessarily a compromise between the high air movement which will promote shrinkage and afford greater uniformity and lower air motion which will cause less shrinkage but which will result in less uniformity of temperature.

"The critical limits seem to be fairly well known and are necessarily determined by economic rather than scientific reasoning. This compromise in air motion likewise bears a relation to the excessive humidities which will be found in stagnant areas and which will result in mold and bacterial growth.

"Normally, relative humidity ranging from 80-88% is accepted as the optimum. The lower limit of this range seems to be fixed by the maximum which can be carried without causing excessive growth of mold.

"While there are dozens of varieties of each, 85% can usually be relied upon to prevent excessive growth under the temperatures normally used. The thing to be guarded against is the prevention of dead spots in which the lack of air circulation may permit either excessive air temperatures or excessive relative humidities.

"This means that the economics of preservation are against the packing of the product tightly within the confines of the room. Conversely, of the free utilization of dunnage, of air space between walls and product, and a free space for air circulation through the product. In other words, overloading increases losses.

"Current practice in washing or filtering air is considered to be so well known that discussion of it is superfluous. Perhaps it is not so well known, however, that neither commercial washers nor commercial filters are wholly effective in removing microscopic particles, such as bacteria or spore.

"It appears that the best results are obtained with the brine spray cold diffuser due to the sterilizing action which is attributed to the carry over of minute particles of salt which are released from the spray of sodium brine."

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